The Heating and Ventilating Magazine

A Monthly Journal of Engineering Progress

JULY, 1926

Mechanical Equipment of New Madison Square Garden

Details and Method of Operation of Heating, Ventilating, and Cooling System for World's Largest Indoor Arena

II.

By F. W. Thompson,

Office of Dwight D. Kimball, Consulting Engineer, New York.

(The general features of the mechanical equipment of the Garden were described in THE HEATING AND VENTILATING MAGAZINE *for March, 1926.)*

THREE months having elapsed since the first article was published* regarding the heating and ventilating of the New Madison Square Garden, ample time has been had for further tests and observations as to the functioning of this great ventilating plant. Up to the time of the first writing, comparatively few tests had been made, and the system could not be judged on its full merits. Since then, many varying conditions have presented themselves and the ventilating plant has done its work. The arrival of the Circus at the Garden put the apparatus to its crucial test, and all indications and observations showed that this huge arena can be, and is, satisfactorily ventilated under most trying conditions.

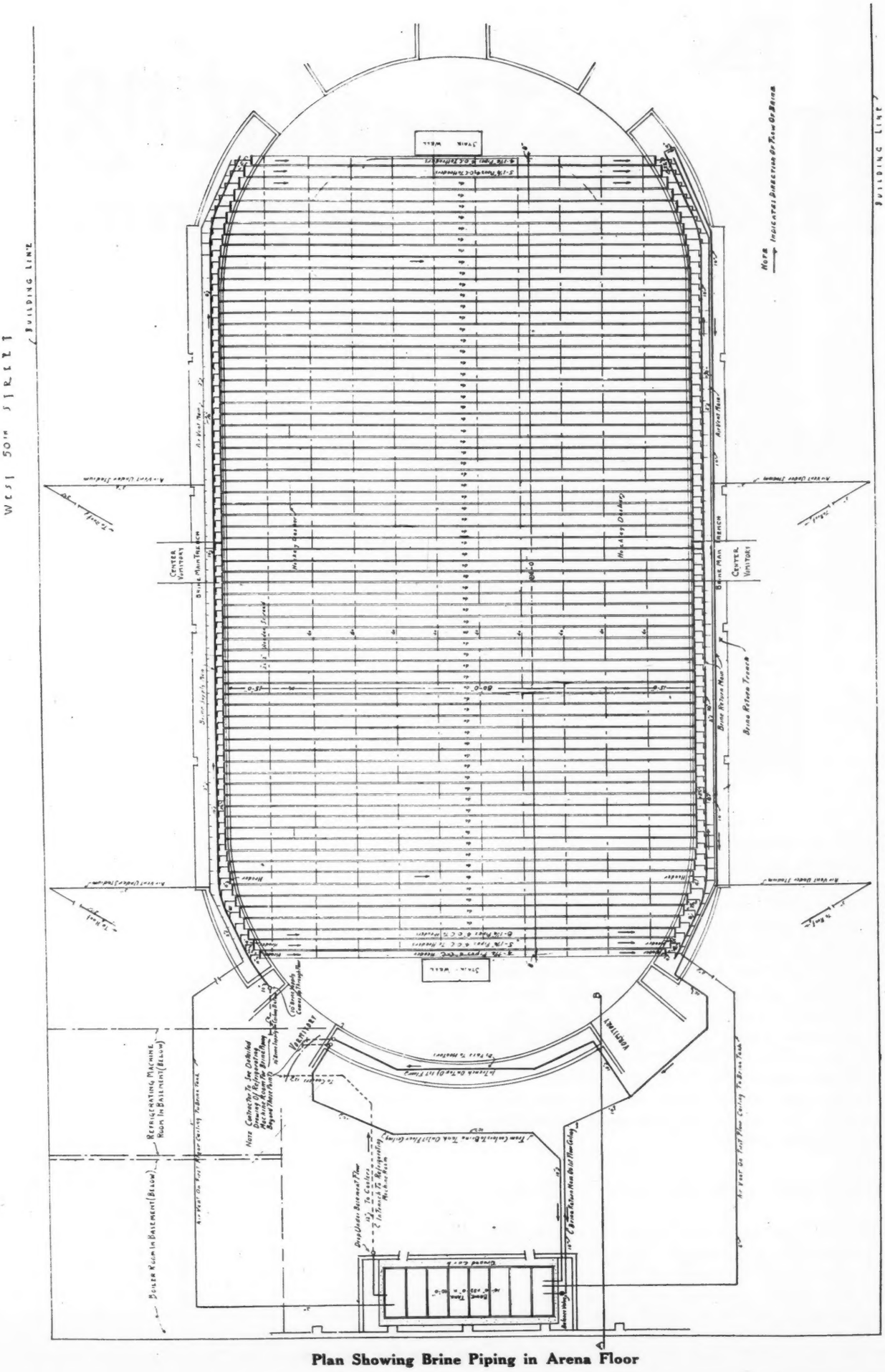
RESULTS OF RECENT TESTS AND ANALYSES OF AIR

Recently, further tests and analyses of the air in the Garden have been made. This was done to determine the actual contents of the air, and to show that the smoky appearance of the air under the strong rays of powerful electric lights, was not really all smoke. The real smoke content was negligible, more dust than smoke, which if viewed through one linear foot, has no bearing on visibility, but if multiplied by the length of the Garden, over 400 ft., gives a hazy appearance. The air is changed every ten minutes, but none the less, small dust particles are always present in the air, arising from the concrete floor of the structure. The result of the test showed that the appearance is more of a haze, such as can be noticed in any dark room into which a ray of light finds its way.

WHY DOWN-FEED SYSTEM WAS CHOSEN

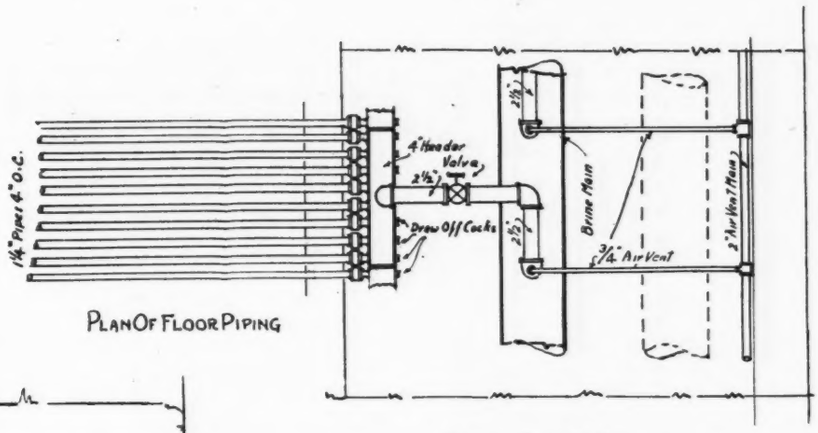
For the design of the ventilating plant, which is a down-feed system, the engineer kept in mind that this building had to be cooled, as well as ventilated, during the summer months and a cooling system is most efficient when air is introduced from above and exhausted at the floor. For this summer cooling eight dehumidifiers—one in each supply fan room—have been installed, and are now in operation, using cooled water from the refrigerating apparatus located in the basement. The refrigerating apparatus has performed its ice-mak-

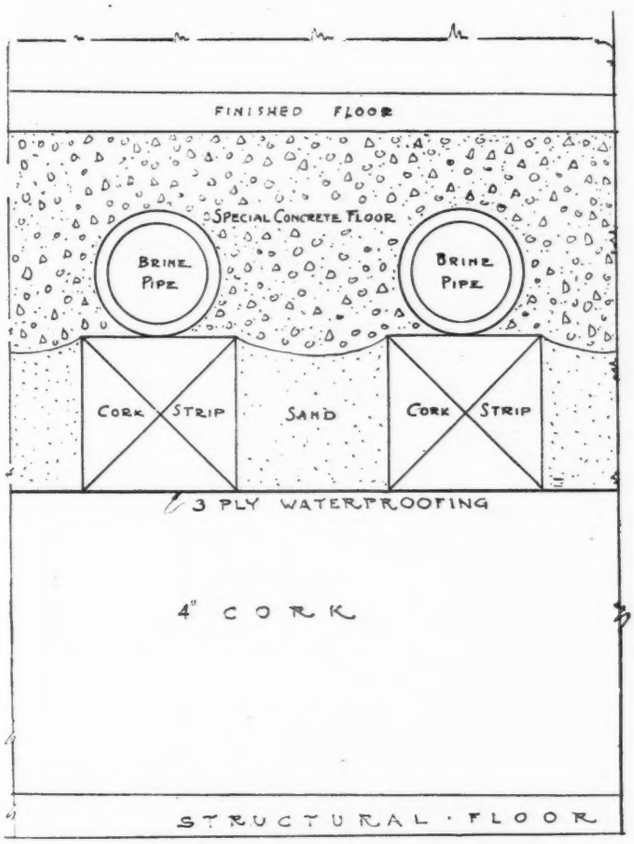
*See THE HEATING AND VENTILATING MAGAZINE for March, 1926.


WEST 50TH STREET
BUILDING LINE
ARENA · FLOOR · PLAN
ALL 3/32 INCH = 1'-0"
WEST 49TH STREET
BUILDING LINE
NOTE — INDICATES DIRECTION OF FLOW OF BRINE
REFRIGERATING MACHINE ROOM IN BASEMENT (BELOW)
BOILER ROOM IN BASEMENT (BELOW)
CENTER VOMITORY
BRINE MAIN TAKEOFF
BRINE RETURN MAIN
BRINE RETURN TRUNKS
VOMITORY
Note Contractor To Ice Oakfield Drawing Of Refrigerating Machine Room Floor Beyond Floor Area

Plan Showing Brine Piping in Arena Floor

Typical Plan of Brine Main Trench





Details of Arena Floor Construction Showing Brine Pipes

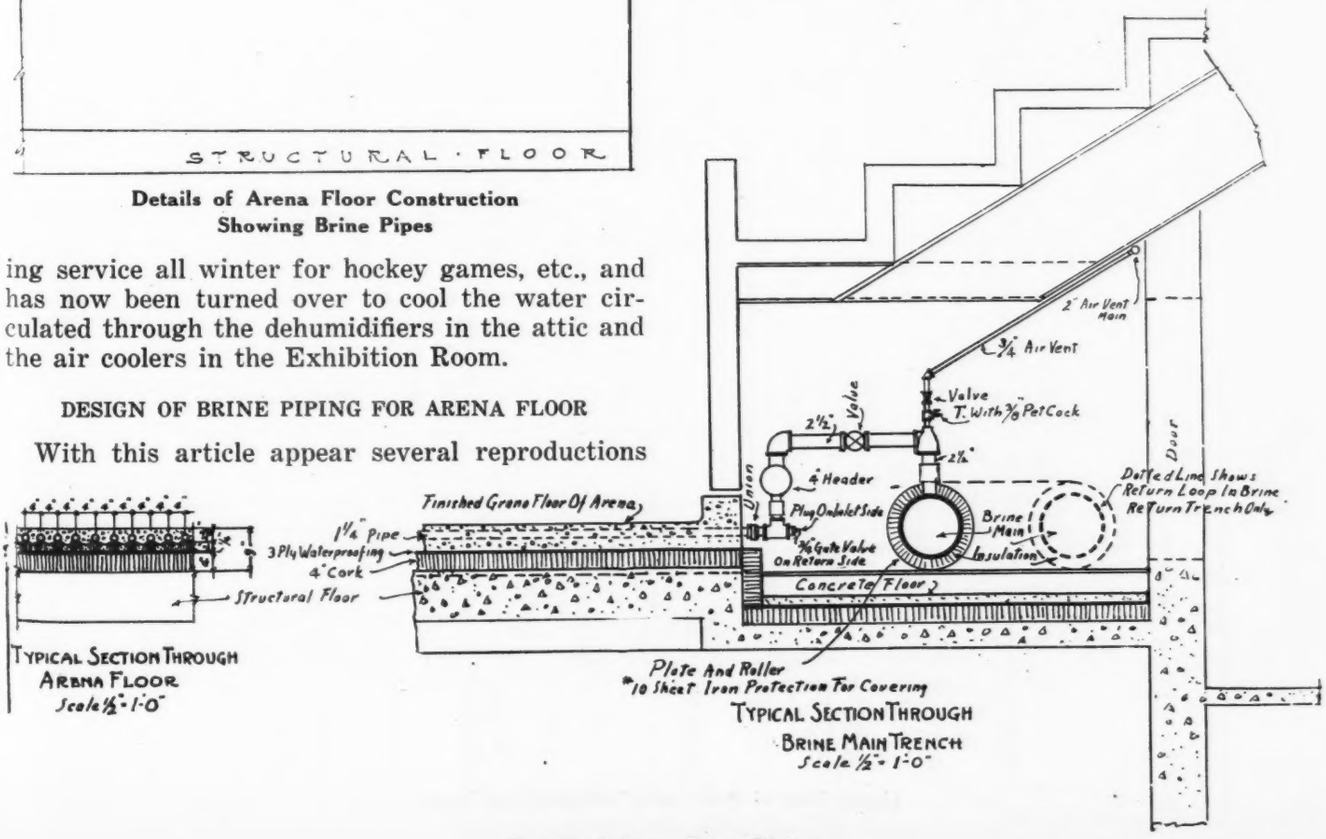
ing service all winter for hockey games, etc., and has now been turned over to cool the water circulated through the dehumidifiers in the attic and the air coolers in the Exhibition Room.

DESIGN OF BRINE PIPING FOR ARENA FLOOR

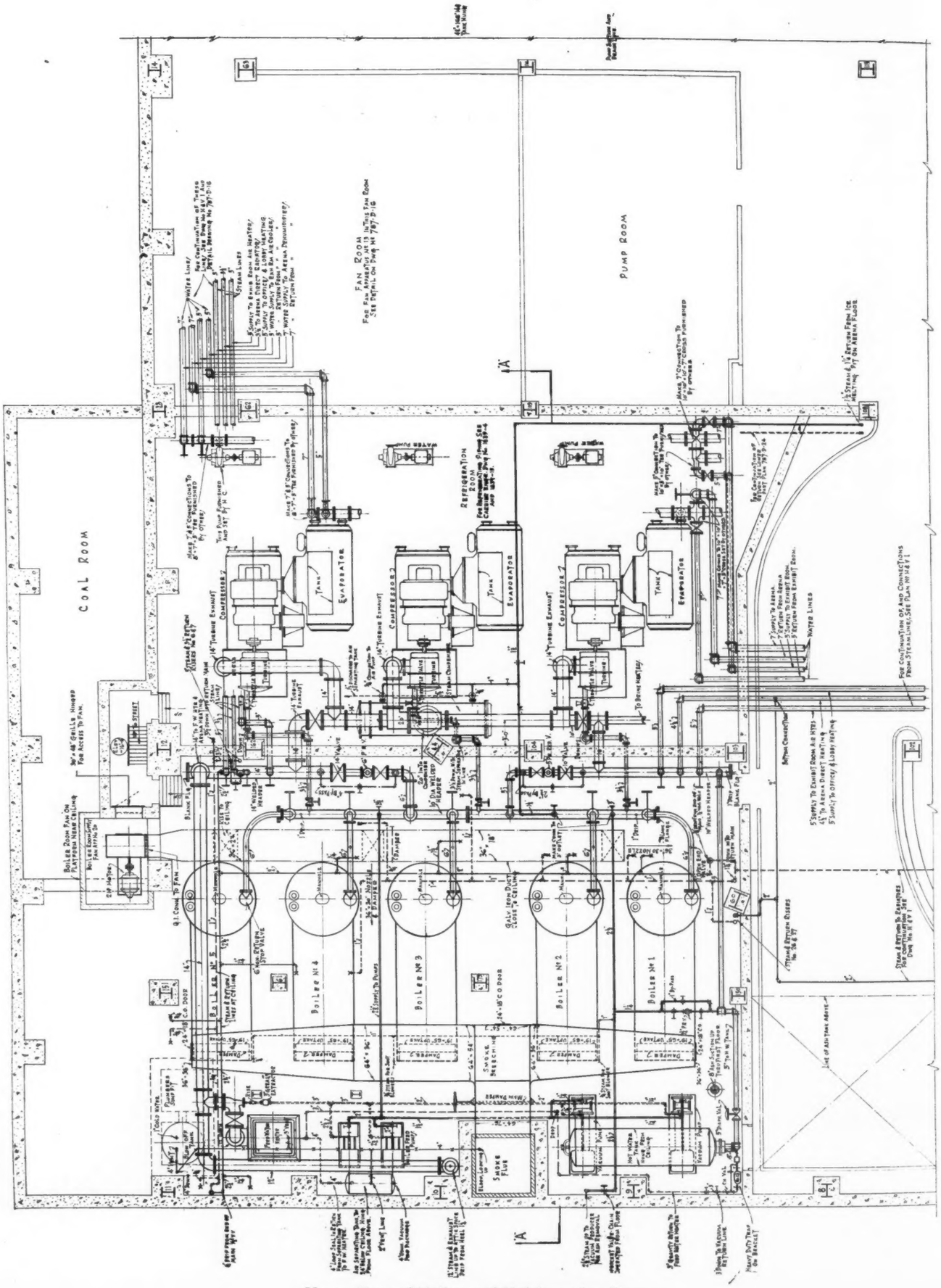
With this article appear several reproductions from the plans that have been made for the work. The layout and detail of the brine piping for the arena floor, which was designed by Funk & Wilcox, engineers, of Boston, Mass., clearly show the vast area of ice floor, as well as the method of floor construction in which these brine pipes are laid. To date there is not a sign of a crack in the finished floor above the brine pipes and the contraction of the floor is ¾ in., which is taken up by the entire floor, which is separated by expansion joints from the remaining building.

THE BOILER PLANT

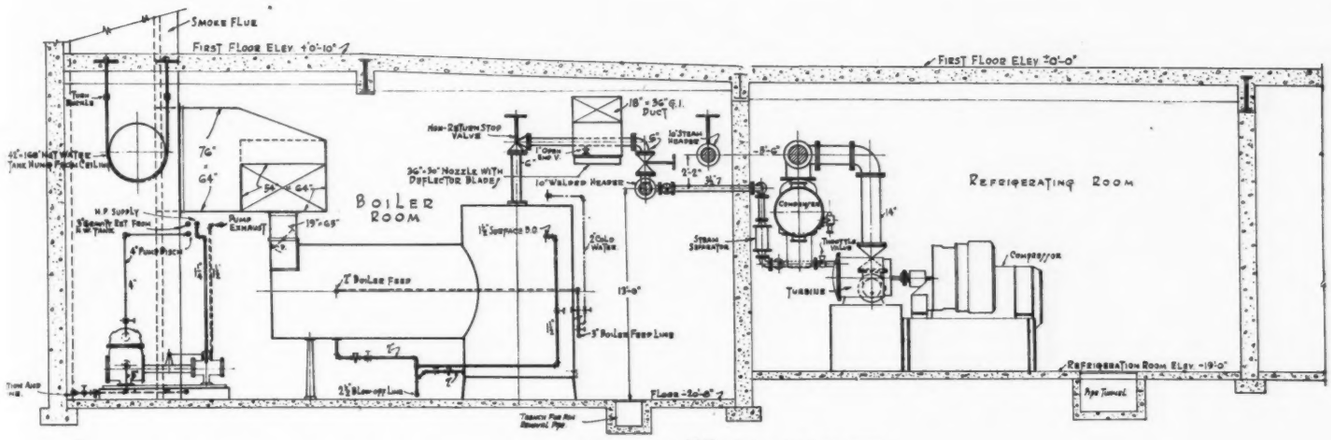
A careful study of the detail plans of the boiler plant would no doubt give the reader more information than could be here presented. The plant consists of five 225-H. P. high-pressure Fitzgibbons



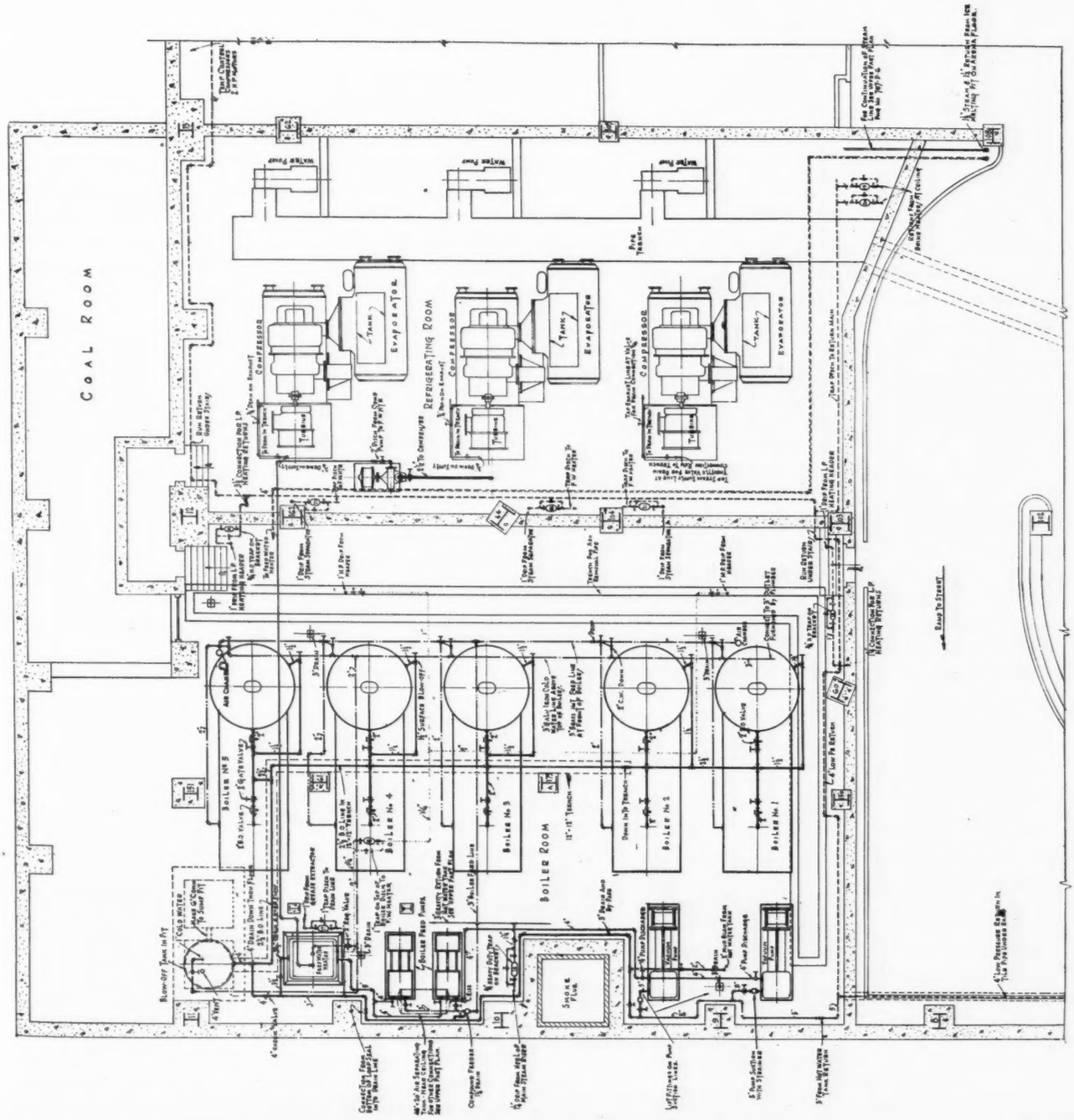
Details of Arena Brine Piping



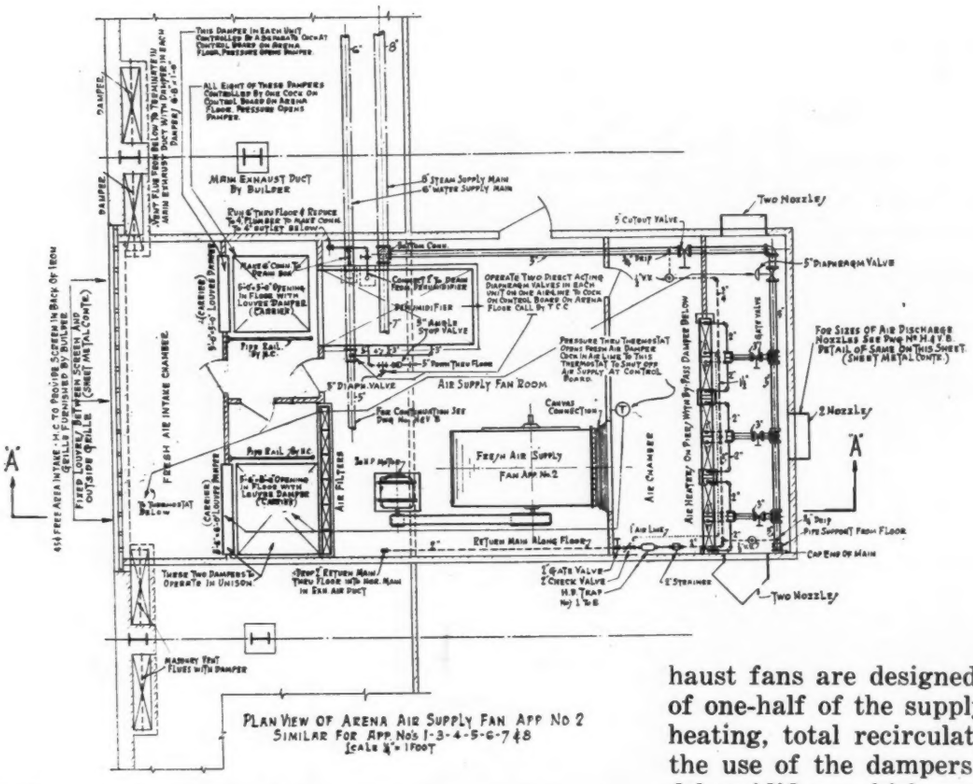
Upper Part of Boiler and Refrigerating Room



SECTION-AA LOOKING NORTH



Lower Part of Boiler and Refrigerating Room


MAIN EXHAUST DUCT
AIR SUPPLY FAN ROOM
FRESH AIR INTAKE CHAMBER
AIR FILTERS
AIR CHAMBER
FRESH AIR SUPPLY FAN APP No 2
RETURN MAIN ALONG FLOOR
PERMIDIFIER
5" DIAPHRAGM VALVE
TWO NOZZLES
PLAN VIEW OF ARENA AIR SUPPLY FAN APP No 2
SIMILAR FOR APP Nos 1-3-4-5-6-7-8
SCALE ¼" = 1 FOOT

Arena Supply Fan Room Typical for 8 Units

boilers; two steam-driven vacuum pumps, two boiler-feed pumps of Worthington manufacture, a Cochrane open-type feed-water heater, and all other apparatus required to make up a complete boiler plant. This work, as well as the heating and ventilating throughout the entire building, was installed by E. G. Woolfolk & Co., engineers and contractors, of New York City.

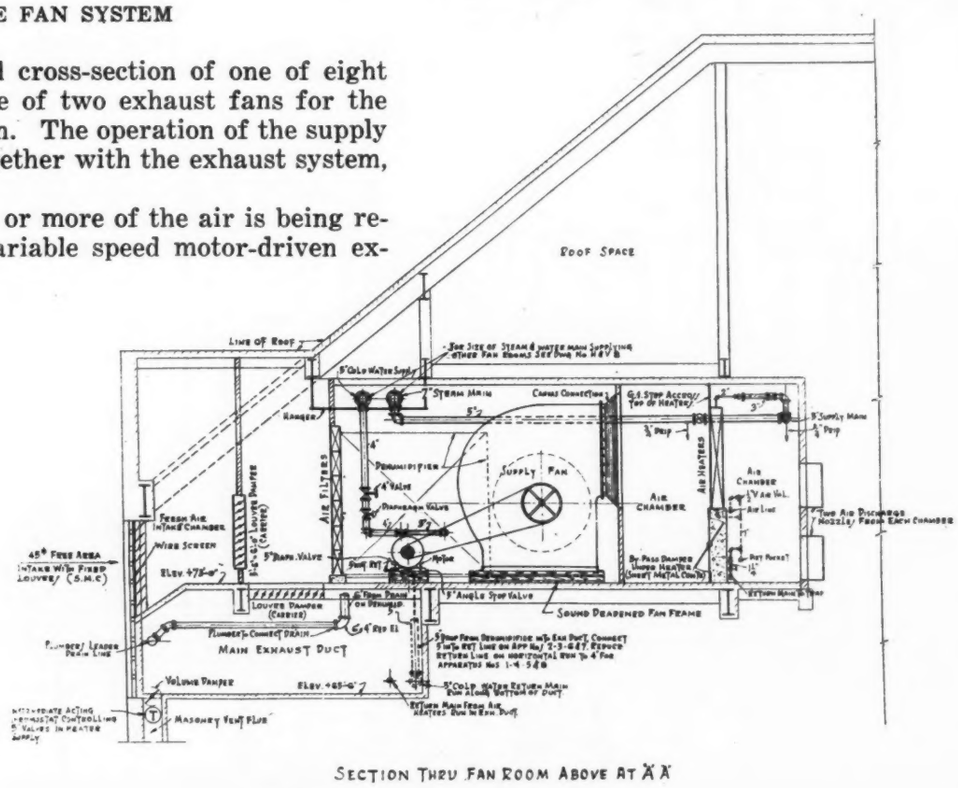
THE FAN SYSTEM

A detail plan and cross-section of one of eight supply fans and one of two exhaust fans for the arena are also shown. The operation of the supply system, working together with the exhaust system, is as follows:

At all times 50% or more of the air is being recirculated as the variable speed motor-driven exhaust fans are designed for a maximum capacity of one-half of the supply-fan capacity. For quick heating, total recirculation can be maintained by the use of the dampers on the intake side of the dehumidifier, which are pneumatically controlled through air cocks mounted in the control room on the arena floor.

NORMAL WINTER OPERATION

At normal winter operation a predetermined temperature of 50° to 55° F. is maintained in the fan discharge chamber. This is accomplished



Section of Fan Room at Line A-A

· FAN · AND · MOTOR · SCHEDULE ·

APPARATUS	SERVICE	CAPACITY C.F.M	S.P. INCHES	SIZE	TYPE	WIDTH	HOUSING	DISCHARGE	OUTLET	SPEED R.P.M.	DRIVE	OUTLET VELOCITY	MOTOR H.P.
1.	SUPPLY GENERAL ARENA	47,500	1¼"	145	SIL.	S	FULL	T.H.	R.H	332	BELT	1680	20
2.	" " "	"	"	"	"	"	"	"	L.H	"	"	"	"
3.	" " "	"	"	"	"	"	"	"	R.H	"	"	"	"
4.	" " "	"	"	"	"	"	"	"	L.H	"	"	"	"
5.	" " "	"	"	"	"	"	"	"	L.H	"	"	"	"
6.	" " "	"	"	"	"	"	"	"	R.H	"	"	"	"
7.	" " "	"	"	"	"	"	"	"	L.H	"	"	"	"
8.	" " "	"	"	"	"	"	"	"	R.H	"	"	"	"
9.	EXHAUST GENERAL ARENA	100,000	⅞"	160	"	D.	"	T.V.	R.H	238	"	1510	25
10.	" " "	100,000	⅞"	160	"	D.	"	T.V.	L.H	238	"	1510	25
11.	EXHAUST EAST TOILET	7,000	1"	6	M.V.	S.	"	T.V.	R.H.	470	"	2120	3
12.	" WEST "	8,400	1"	6	"	S.	"	T.V.	L.H	530	"	2500	5
13.	SUPPLY EXHIBITION ROOM	21,250	1¼"	110	SIL.	S.	"	T.H.	L.H.	474	"	1650	10
14.	" " "	"	1¼"	"	"	S.	"	T.H.	R.H.	"	"	"	"
15.	" " "	"	1¼"	"	"	S.	"	T.H.	L.H.	"	"	"	"
16.	" " "	"	1¼"	"	"	S.	"	T.H.	R.H	"	"	"	"
17.	EXHAUST EXHIBITION ROOM	25,000	1"	95	"	D.	"	B.H.	L.H	543	IDLER	1500	7½
18.	" " "	"	1"	95	"	D.	"	B.H.	R.H.	543	"	1500	7½
19.	" " "	50,000	1"	125	"	D.	"	T.H.	L.H.	336	"	1330	15
20.	BOILER ROOM SUPPLY	9,000	⅜"	7	M.V.	S.	"	T.H.	L.H.	280	DIRECT	1750	2
21.	EAST LOBBY	7,500	⅝"	6¼"	"	S.	"	T.H.	R.H	365	BELT	1800	3
22.	NORTH EAST LOBBY	11,500	¾"	8	"	S.	"	"	R.H	270	"	1550	5
23.	SOUTH EAST LOBBY	"	"	"	"	"	"	"	L.H	"	"	"	5
24.	KITCHEN EXH. (FIRST FLOOR)	4800	¾"	5	"	"	"	T.V.	L.H.	495	IDLER	1800	2
25.	" " (N.E. BASEMENT)	4000	¾"	4	"	"	"	B.H.	R.H.	625	BELT	2000	2
26.	" " (S.W. BASEMENT)	4000	¾"	4	"	"	"	T.H.	L.H.	625	IDLER	2000	2
27.													
28.													
29.													
30													

FACE OF PULLEYS TO BE 1" GREATER THAN WIDTH OF BELT.

MOTOR SPEEDS NOT TO EXCEED 1200 R.P.M.
EXCEPT MOTOR FOR FAN APP. Nº 9 & 10 TO BE 850 R.P.M.
MOTORS FOR APP. Nº 9 & 10 TO BE VARIABLE SPEED
ALL OTHERS TO BE CONSTANT SPEED.

· HEATER · SCHEDULE ·

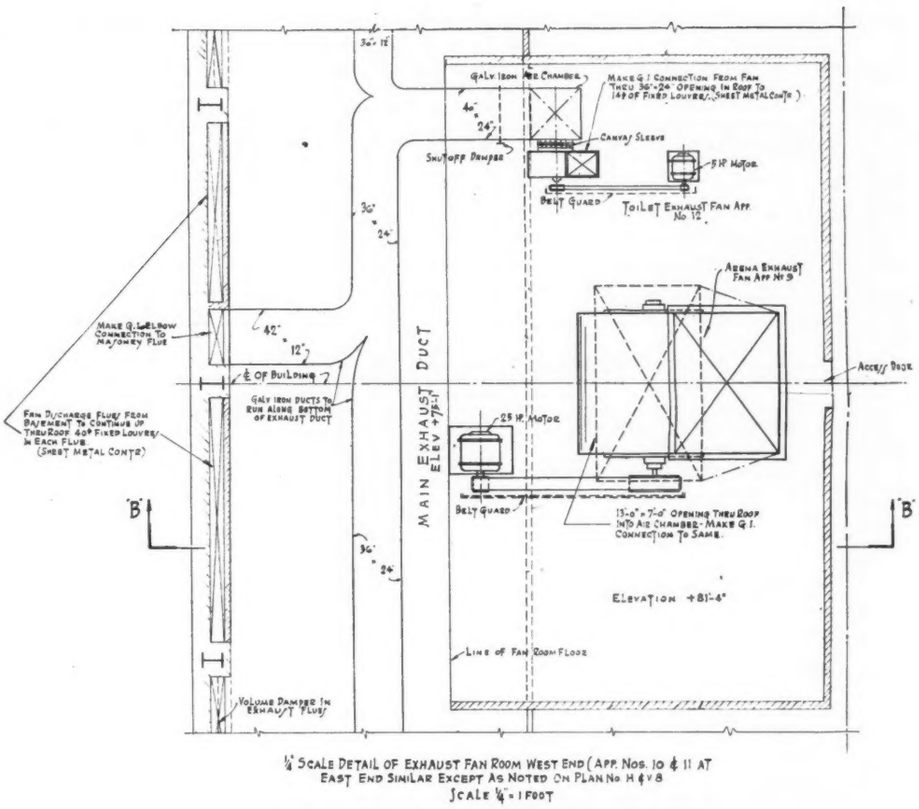
	APPARATUS Nº 1 PREHEATER	APPARATUS Nº 13 PREHEATER	APPARATUS Nº 21 PREHEATER	APPARATUS Nº 22 PREHEATER	APPARATUS Nº PREHEATER
CUBIC FEET OF AIR PER MINUTE	47,500	21,250	7,500	11,500	
VELOCITY THRU HEATERS	650'	600'	600'	600'	
FACE AREA OF HEATERS	72†	36	14†	20†	
TEMPERATURE RISE	30°-80°	30° TO 80°	0°-83°	0°-83	
NUMBER OF TUBES DEEP	2	2	3	3	
LENGTH OF TUBES	6'-0"	6'-0"	3'-6"	5'-0"	
NUMBER OF UNITS WIDE	6	3	2	2	
NUMBER OF UNITS HIGH	1	1	1	1	
TOTAL NUMBER OF UNITS	6	3	2	2	
LINEAL FEET OF TUBING	1260	630	371	530	
POSITION OF TUBES	VERTICAL	VERTICAL	VERTICAL	VERTICAL	
SIZE OF STEAM INLET PER UNIT	2"	2"	2"	2½"	
SIZE OF RETURN OUTLET PER UNIT	1"	1"	1"	1"	
SIZE OF STEAM CONNECTION PER GROUP	3	3½"	3"	3½"	
SIZE OF RETURN CONNECTION PER GROUP	1¼"	1½"	1¼"	1½"	
SIZE OF SUPPLY TO EACH FAN ROOM	5"	3½"			
SIZE OF RETURN TO EACH FAN ROOM	2"	1½"			

APPARATUS Nº's 2-3-4-5-6-7 & 8 INCL. SIMILAR TO APP. No. 1
" " 14-15-16 SIMILAR TO APP. No. 13
" " 23 SIMILAR TO APP. Nº 22.

Fan and Motor and Heater Schedules for New Madison Square Garden

through a thermostat controlling the two dampers on the intake side of the air filters, one in the floor to the recirculating or exhaust duct and the other to the outside air chamber. These two dampers are set in opposed positions and act together. The two dampers on the intake side of the dehumidifier, being individually controlled from the control room, can be manipulated for either outside or recirculated air as operating conditions warrant.

The control of the operation of the ventilating plant, as previously stated, is from a central station, in which is located the remote control of all arena supply and exhaust fan motors, a temperature indicator instrument registering the temperature at 24 different stations in the arena, the control of dampers and water valves at the dehumidifiers and the control for the ozone apparatus.

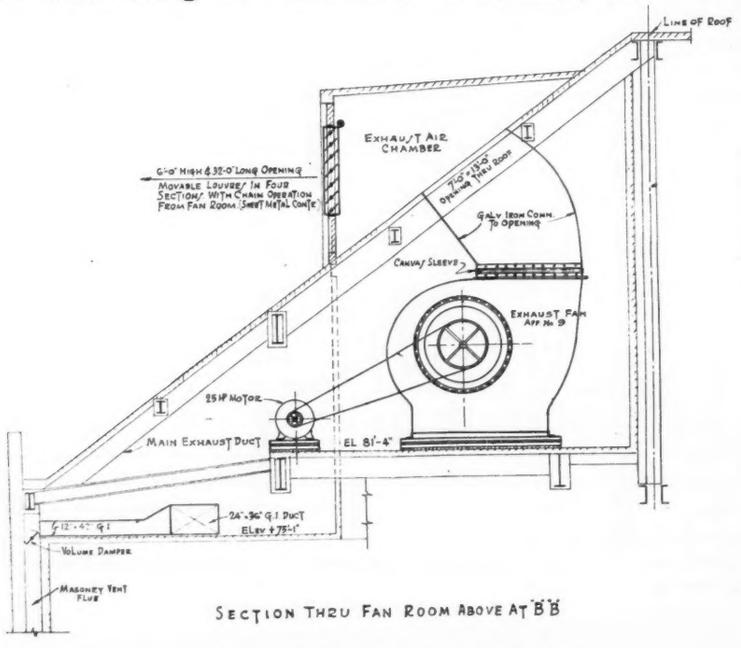

GALV. IRON AIR CHAMBER
MAKE G.I. CONNECTION FROM FAN THRU 36"×24" OPENING IN ROOF TO 149 OF FIXED LOUVER (SHEET METAL CONTR.)
CANVAS SLEEVE
SHUT-OFF DAMPER
5 H.P. MOTOR
BELT GUARD
TOILET EXHAUST FAN APP. No 12
ARENA EXHAUST FAN APP. No 9
MAKE G.I. ELBOW CONNECTION TO MASONRY FLUE
MAIN EXHAUST DUCT ELEV +75'-1"
℄ OF BUILDING
GALV. IRON DUCTS TO RUN ALONG BOTTOM OF EXHAUST DUCT
FAN DISCHARGE FLUES FROM BASEMENT TO CONTINUE UP THRU ROOF 60# FIXED LOUVRES IN EACH FLUE (SHEET METAL CONTR.)
ACCESS DOOR
25 H.P. MOTOR
BELT GUARD
13'-0" × 7'-0" OPENING THRU ROOF INTO AIR CHAMBER - MAKE G.I. CONNECTION TO SAME.
B
B
ELEVATION +81'-4"
LINE OF FAN ROOM FLOOR
VOLUME DAMPER IN EXHAUST FLUES

¼" SCALE DETAIL OF EXHAUST FAN ROOM WEST END (APP. NOS. 10 & 11 AT EAST END SIMILAR EXCEPT AS NOTED ON PLAN No. H & V 8
SCALE ¼" = 1 FOOT

Arena Exhaust Fan Room, Typical for Two Units

The air, upon being discharged through the heaters, is raised to a predetermined temperature governed by an intermediate acting thermostat set in the air discharge chamber. This thermostat controls the steam supply to the heaters. From the heater discharge chamber the air is diffused by nozzles, fitted with movable blades, in various directions to the arena.

Air continually passes through the dehumidifier, no water being used in winter. In summer, the cooled water from the refrigerating plant is circulated through any or all the dehumidifiers and the system is under different operation. The thermostat controlling the diaphragm valve on the air heaters is rendered inoperative, and the by-pass dampers under the heaters are thrown open to give less resistance. The two dampers on the intake side of the air filters are then manually operated by air control from the control room, while the operation of the dampers at the dehumidifier remains the same. The need of more or less water through the dehumidifier is controlled from the central operating station and is left to the man in charge for properly cooling this vast space.


LINE OF ROOF
EXHAUST AIR CHAMBER
6'-0" HIGH & 32'-0" LONG OPENING
MOVABLE LOUVRES IN FOUR SECTIONS WITH CHAIN OPERATION FROM FAN ROOM (SHEET METAL CONTR.)
7'-0" × 13'-0" OPENING THRU ROOF
GALV. IRON CONN. TO OPENING
CANVAS SLEEVE
EXHAUST FAN APP. No 9
25 H.P. MOTOR
MAIN EXHAUST DUCT
EL 81'-4"
24"×36" G.I. DUCT ELEV +75'-1"
12"×42" G.I.
VOLUME DAMPER
MASONRY VENT FLUE

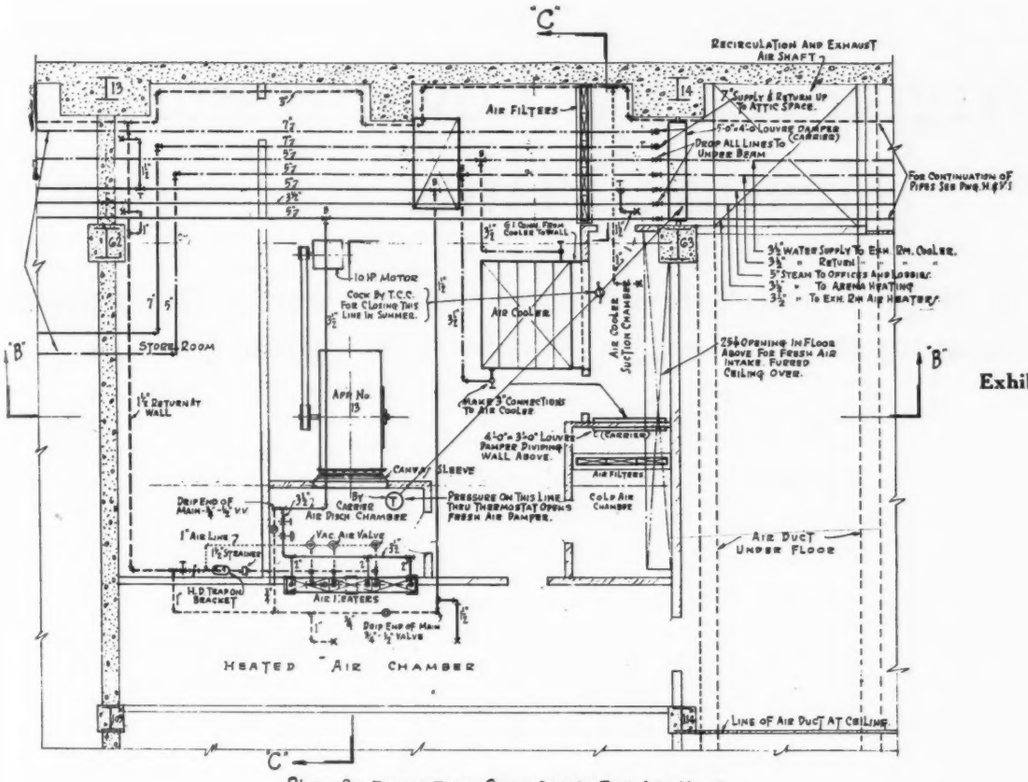
SECTION THRU FAN ROOM ABOVE AT B B

Section of Fan Room at Line B-B

The exhaust fan, under both winter and summer conditions, is operated as the conditions require. Upon increased recirculation through the supply fans the speed of the exhaust fan is reduced accordingly.

OPERATION OF EXHIBITION ROOM SUPPLY FANS

A somewhat similar arrangement of apparatus and operation is provided for the four supply fans in the Exhibition Room. These are a closed type of air cooler, instead of dehumidifiers, and local control of the fan motors is provided, instead of through a central operating station. All dampers are automatically controlled through a thermostat in the fan discharge chamber.


"C"
RECIRCULATION AND EXHAUST AIR SHAFT
AIR FILTERS
7" SUPPLY & RETURN UP TO ATTIC SPACE.
5'-0"x4'-0" LOUVRE DAMPER (CARRIED)
DROP ALL LINES TO UNDER BEAM
FOR CONTINUATION OF PIPES SEE PNG. H & V 1
3½" WATER SUPPLY TO EXH. RM. COOLER.
3½" " RETURN " " "
5" STEAM TO OFFICES AND LOBBIES.
3½" " TO ARENA HEATING
3½" " TO EXH. RM AIR HEATERS.
10 HP MOTOR
COCK BY T.C.C. FOR CLOSING THIS LINE IN SUMMER.
AIR COOLER
AIR COOLER SUCTION CHAMBER
STORE ROOM
"B"
25½ OPENING IN FLOOR ABOVE FOR FRESH AIR INTAKE. FURRED CEILING OVER.
1½" RETURN AT WALL
APP No 13
MAKE 3" CONNECTIONS TO AIR COOLER
4'-0"x 3'-0" LOUVRE DAMPER DIVIDING WALL ABOVE.
CANVAS SLEEVE
AIR FILTERS
DRIP END OF MAIN
BY CARRIER AIR DISCH. CHAMBER
PRESSURE ON THIS LINE THRU THERMOSTAT OPENS FRESH AIR DAMPER.
COLD AIR CHAMBER
AIR DUCT UNDER FLOOR
1" AIR LINE
VAC. AIR VALVE
1½" STRAINER
H.D. TRAP ON BRACKET
AIR HEATERS
DRIP END OF MAIN
HEATED AIR CHAMBER
LINE OF AIR DUCT AT CEILING
"C"

PLAN OF EXHIBITION ROOM SUPPLY FAN APP No. 12
NORTH WEST CORNER OF BUILDING

Exhibition Supply Fan Room Typical of Units

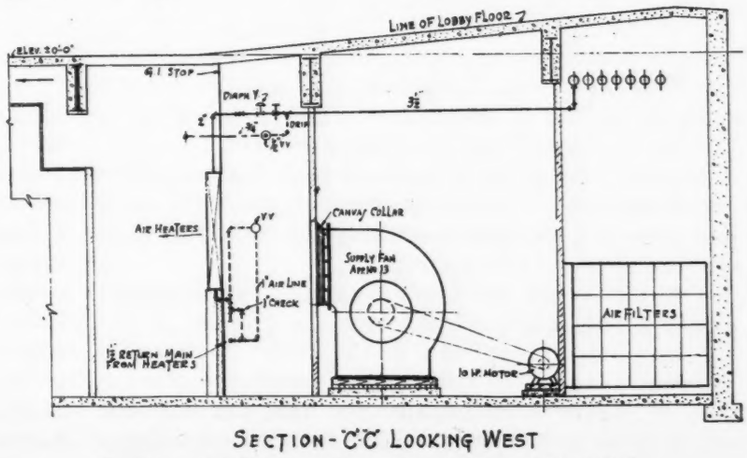
EXTENT OF VENTILATING REQUIREMENTS

To appreciate the size and extent of the ventilation requirements for this great arena, one has but to look at the list of fans on the motor schedule and analyze the various systems and air quantities. The total of supply and exhaust represents a movement of nearly one million cubic feet of air every minute. To do this a little over 300 H.P. in electric motors are used. By the use of Silentvane fans, which are installed in both the supply and exhaust of the arena and exhibition room, a saving has been effected of over 150 H.P. in electric motors, besides assuring a specified amount of air irrespective of fluctuations in static pressures.

To give the reader an idea of the high type of work and materials represented in the mechanical equipment of this great garden, the following list of those who contributed to the successful undertaking of the work is given:

Architect, Thomas W. Lamb. Consulting Engineer, heating, ventilating and cooling, Dwight D. Kimball. Heating and ventilating contractor, E. G. Woolfolk & Co., Inc. Dehumidifiers, air coolers, automatic dampers, cooling control and refrigeration machinery, Carrier Engineering Corporation. Ventilating fans and air heaters, B. F. Sturtevant Company. Ventilating fan motors and starters, General Electric Company. Temperature regulation, Johnson Service Company. Temperature indicators, American Temperature Indicator Company. Ozonizers, U. S. Ozone Company. Registers and grilles, Hart & Cooley Company. Sheet metal work, Charles Hartmann Company. Radiators, American Radiator Company. Radiator return valves, Warren Webster & Company. Pipe covering, Johns-Manville, Inc. Boilers, Fitzgibbons Boiler Works. Ash-removal system, Vacuum Ash & Soot Conveyor Company.

In addition to the freezing of the ice in the Garden, the task of thawing the ice after use presented an interesting problem. To effect thawing, a portion of the brine is by-passed to two heaters, and thence through the floor pipes. As the ice becomes loosened, it is broken up and carted away.



SECTION - C-C LOOKING WEST

Section of Exhibition Room Supply Fan at Line C-C

The Argument for Low-Pressure Heating Plants

A Comparison of High- Versus Low-Pressure Systems and a Description of Typical Heating Installations in Minneapolis Public Schools

By A. L. Sanford, M. E.

Mechanical Engineer, Minneapolis Public Schools.

(From a paper presented at the annual meeting of the National Association of Public School Officials in Toronto, Ont., May, 1926.)

Definition of a High-Pressure System

IT is usually understood that a high-pressure system is one in which the boiler plant generating steam operates at a pressure exceeding 15 lbs. gauge pressure, and up to 150 lbs. gauge pressure, and in which all auxiliary apparatus, such as forced-draft blowers, boiler-feed pumps, vacuum pumps, ventilating fans, stoker mechanism, ash-handling equipment, etc., are operated by steam-driven engines or turbines. Very often, engine-driven generators for making electric power are a part of high-pressure systems.

Incidental portions of high-pressure systems are feed-water heaters, stokers, pressure-reducing valves, back-pressure valves, exhaust loads, cooling-water condensers, and many other steam specialties.

A high-pressure system is primarily a *power plant*. The steam from the boilers is used to drive all of the steam engines at full boiler pressure. THe exhaust steam from the steam engines is used for heating purposes in mild weather, but in cold weather it must be augmented by live steam fed through pressure-reducing valves which are usually set to deliver at a low pressure of 5 lbs. gauge. The piping for the heating system is therefore designed for a low pressure of from 2 lbs. to 5 lbs. gauge.

Definition of Low-Pressure System

A LOW-PRESSURE system is one in which the boiler plant generates steam at pressures less than 10 lbs. gauge, and in which all auxiliary apparatus, such as boiler-feed pumps, vacuum pumps, ventilating fans, etc., are operated by electric-motor power which is purchased from an outside source, usually the local electric company.

A low-pressure system is essentially a *heating plant*. The steam from the boilers is used directly for heating purposes. The piping for the heating system is therefore designed for a low pressure of from 2 lbs. to 5 lbs. gauge.

FOR ten years past, all new Minneapolis public schools have been designed for low-pressure systems of heating. In all cases where large additions have been made to old buildings, the systems of steam generation have been changed over in the entire building from high pressure to low pressure. When the change was made, a great many designing engineers did not take kindly to the low-pressure generation of steam, and it was against their united efforts that George F. Womrath, business superintendent, was able to prevail upon the Board of Education to give a fair trial to the low-pressure type of heating system.

Piping for heating systems of both high and low-pressure plants are designed for from 2 lbs. to 5 lbs. pressure, and are essentially the same throughout the spaces to be heated.

The difference between high and low-pressure systems, therefore, is such that the niceties of design are wholly confined to the boiler, pump and fan rooms, and have to do entirely with the generation of steam economically for the purpose for which it is to be used—which in school buildings is—*heating*.

In the Minneapolis public schools we favor low-pressure boiler plants and are using them exclusively in new plants for the following reasons:—

1. The cost of electric current for power purposes paid by the Minneapolis Board of Education is less than the cost at which the Board of Education could produce an equivalent amount of high-pressure steam for prime movers.

2. The cost of maintaining the boilers, their settings, brick work, grates, etc., is less with low-pressure operation, because the flue gas and water temperatures are evenly maintained for long intervals. This avoids excessive expansion and contraction which is present in high-pressure plants which are allowed to cool down at night and then brought up to a maximum temperature early every morning. Brickwork and grates last much longer under low-pressure operation.

3. The cost of providing competent operating engineers and firemen is less with low-pressure plants as men of less skill and experience may be taught proper operation of plants in a few weeks. Second and third-class licenses may be used in low-pressure plants, while first-class and chief engi-

neers licenses are required for high-pressure plants.

4. The cost of repairs to piping, stuffing boxes, gaskets, is less with low-pressure operation. Leaky gaskets and stuffing boxes are few, due to a minimum of expansion and contraction, and blow-outs are negligible.

5. The cost of plant operation, other than personnel, is less with low-pressure boiler plants as there are no high-priced steam specialties and auxiliaries to maintain. Some distinguished engineers claim that the use of exhaust steam from engines and pumps for heating is a great saving, but in my opinion they fail to take into account the loss of steam through the exhaust head during the early Fall and late Spring when power must be provided for driving fans and pumps, and when little or no heat is wanted.

6. The cost of installing a low-pressure boiler plant is usually about 25 to 35% of the cost of providing a high-pressure plant at the same size.

7. The cost of depreciation of the low-pressure boiler plant is less than that of the high-pressure plant, because the first cost is less and the life is far greater.

8. The cost of the boiler room or the space given over to the low-pressure plant is less than that of the high-pressure plant, for the floor area required is less and the height of the boiler room is lower.

9. The cost of operating personnel is less with the installation of low-pressure boiler plants than with high-pressure plants, because a longer firing period can be maintained and this allows the engineer an opportunity to attend to other duties in the building, instead of remaining constantly in the boiler room. This requires less man power for the building. In high-pressure plants, a man must be constantly on duty.

10. Low-pressure plants are simple in design and operation. There is little danger of damage by explosion, even should a rupture occur, due to lack of water. High-pressure plants are complicated in design and finicky in operation and *low water* is the constant nightmare of the operating engineer, for low water in a high-pressure boiler always means extensive boiler repairs, or new boilers, and very often operatives or "innocent bystanders" are injured or killed by boiler explosions.

11. Low-pressure plants are quickly placed in full load operation. Electric-driven vacuum pumps can almost instantly clear piping of air and start circulation of steam vapor, even before any pressure shows on the gauge. This is a wonderful help on a cold Monday morning. In the operation of a high-pressure plant, the operating steam pressure must be obtained before the pumps can be started up and usually turning the steam onto the house mains will so reduce the pressure that the pumps will stop until the pressure is again built up. A low-pressure system will save from 30 to 60 minutes in elapsed time required for bringing plant up to full operation.

Similarly a low-pressure plant can be banked and safely left much earlier than the high-pressure plant. Indeed, it is often impossible to bank a fire in a high-pressure plant using twin-arch construction, as the excessive heat of the brick work kindles the fresh charge of coal, runs up the boiler pressure and forces open the pop safety-valve, with a great loss of steam.

12. Low-pressure plants are immune to trouble from oil, when once the piping system is thoroughly cleaned out. The high-pressure plant must constantly be cleared of oil from exhaust lines, for oil seeping back to the boilers means priming and bad boiler conditions.

Description of Typical Heating Plants of Minneapolis Public Schools

The boilers used are steel-plate, smokeless, downdraft, firebox, portable type, for operation at a maximum pressure of 15 lbs. and are tested at 75 lbs. These operate at from 2 lbs. to 5 lbs. pressure. Two boilers are installed in grade-school buildings and three larger boilers are installed in high-school buildings. These boilers are used exclusively for heating purposes.

Coal used is Franklin Company, Illinois, 3 x 2 prepared sizes, or Youghiogheny Dock Run, at an average cost of $7.011 per ton (calendar years—1924 and 1925).

Coal bins are provided of sufficient size to accommodate from 60% to 100% of year's supply. This enables Minneapolis to buy advantageously at low market prices.

Boiler rooms are located at the back of the school building, and outside of the building proper, in order to reduce fire hazard. The boiler rooms are placed lower than the main building so that return water from radiation will flow back by gravity wherever possible. Ample space is provided around boilers for firing, cleaning, and drawing of flues. Boiler rooms are "light and airy," having outside windows at grade and the interior walls and ceiling and all piping and apparatus are painted in white to preserve the "light and airy" feeling.

STEAM DISTRIBUTING SYSTEM

From the boiler nozzles, steam enters a header constructed of 16 in. O.D. pipe, with welded necks and flanges for all openings. This eliminates all trouble from gasket leaks which are so common to headers made up of flanged fittings and nipples, and the cost is much reduced. This header serves as an auxiliary steam reservoir.

From the header the main steam supply to the house is carried directly to the attic space where it branches out and supplies all down-feed risers.

A succeeding issue will contain the second section of Mr. Sanford's article, in which he will present comparative coal and electric power costs in eight Minneapolis school buildings.

Central Heating Plant for Canadian Government Buildings

Principal Features of Combination Steam and Water Heating System for Federal Group in Ottawa

By Dr. Peter H. Bryce, M. A.

IT is hard to associate the view from Nepean Point, some 100 ft. above the Ottawa river, whence one can see the foaming waters of the Kettle, or Chaudiere of the great falls of the Ottawa, with a plain stone building, some six stories high, on the river bank, under the cliff itself, in which is installed the heating plant to keep warm the 300 odd legislators of Canada, when they have exhausted their own steam and heat.

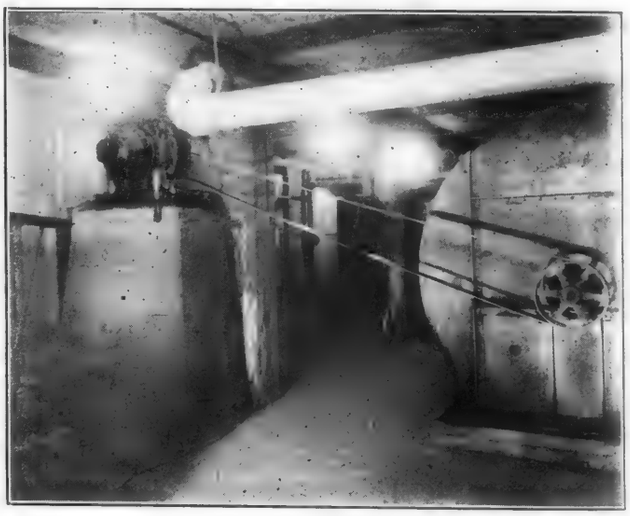
Hidden under the cliff so completely that even a citizen can hardly find the way to this power house, there has been constructed within the past few years one of the most complete illustrations on the American continent of the application of mechanics and physics to the problem of heating in a climate of Lat. 45° 43° N, a series of large government buildings.

PRESENT PARLIAMENT BUILDINGS REPLACE THOSE DESTROYED BY FIRE

In February, 1916, the former Parliament Buildings were destroyed by fire, and the task of rearing a larger modern building on the beautiful site above the Ottawa, looking toward the blue Laurentians to the north, was undertaken.

The firm of Peter Lyall Company of Montreal, who erected the buildings, also contracted to install the heating plant. They have supplied four water-tube-boilers, of 500 H.P. each, of the Babcock-Wilcox type, constructed by Goldie and McCullough of Galt, Ont., over four smokeless furnaces of the Murphy (Detroit) type, with automatic feed from a traveling hopper in which each charge of coal, received from coal bin above, is weighed.

The coal reaches the fire boxes of the furnaces, one after the other as it is required, and is coked as it passes from the hopper over incandescent iron plates at the top of the sloping fire-bars. The gases of the coal thus driven off pass into the draft of the furnace to the combustion chamber behind the grate bars.



Fan for Supply to Senate Chamber

It has not been found necessary in the coldest weather to utilize, for the work to be done, more than 1500 H.P. of the boilers; while a year's fuel has not exceeded 10,000 tons of pea coal, obtained from the British Empire mines in Nova Scotia.

Air-Washer Pumps for Supply to Commons Chamber

Ducts Leading from Main Building to Basement Library

laid down at $6.00 per ton in Ottawa. The coal is brought to Montreal in the summer by water and could be delivered by barges up the Ottawa directly at the plant.

The fuel feed is automatic and is maintained by sloping grates and revolving bars at the bottom, on which are teeth which largely break up the cinders to powder. The cinders are from time to time withdrawn down a chute and are driven thence through a duct by pressure and exhaust steam, and are delivered finally into the outside bin. They are in demand for making a standard building block of much strength and having splendid insulating qualities.

TYPICAL OPERATING FIGURES

On October 10, 1925, at 3 P.M., the gauges showed 750 H.P. being utilized and 3700 gal. of water per hour being pumped. The gauges were set at 100 lbs. and range from 75 to 125 lbs. pressure; while the pumps return the exhaust water at a temperature of about 145° F., after having been in part utilized in heating the building.

A steam and electric compressor controls the steam in the long lines of distribution pipes for heating directly, as well as for heating the water in a Ross (Montreal) arrangement in which the steam passes through numerous tubes surrounded by water.

DISTRIBUTION PIPING NEARLY A MILE IN LENGTH

The long lines of distribution piping insulated with asbestos packing, and extending nearly a mile, with take-offs to seven buildings, consist of a flow and return hot water pipe, 12 in. in diameter and a steam pipe of 10 in. diameter on the flow and 5 in. on the return. The efficiency is seen in the fact that the hot water, which flows at 124° F., returns, after a run of nearly two miles, at 113° F. or with a loss of only 11°.

The buildings heated are:—

	Square Feet of Steam Rad. used.
(a) The Parliament Buildings with Library	10,758
(b) West Block	4,478
(c) East Block	5,537
(d) Langelier Block	2,832
(e) General Post Office	1,449
(f) Supreme Court Bldg	1,156
(g) Soldiers' Re-establishment Bldg	1,909

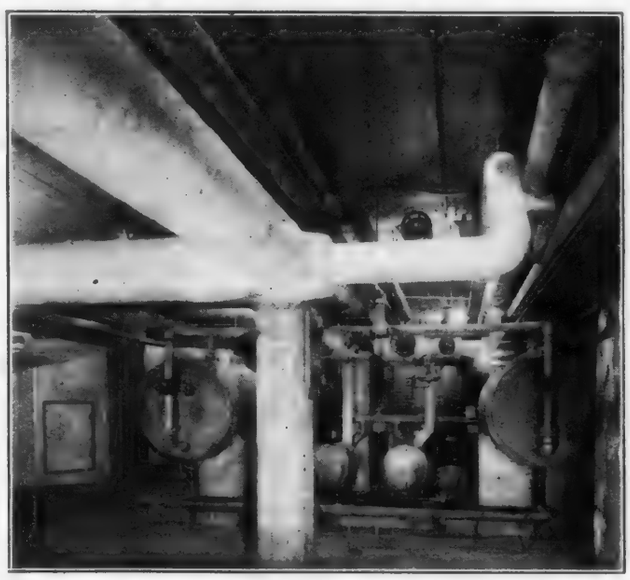
The average work done on January 8, 1923, (a cold day) was that 108,000 lbs. of coal utilized 965,046 lbs. of water in the system in 24 hours.

Apart from the construction of the grate bars and automatic feed, the efficiency of the heating system is notably improved by the high stack (135 ft.). In addition, the temperature in the baffles, which are built across the combustion chamber beyond the grate bars, which reaches over 700° F., is registered by a thermo-couple and a recording pyrometer in the superintendent's office, so that the work being done by each boiler is constantly under observation. Similarly there is a CO_2 recorder attached to each boiler, and the work done has a resultant of 8.8 in a possible maximum efficiency of 9.2 heat units of the coal, according to tests made.

OPERATION OF WATER HEATING SYSTEM

The water is delivered to the boilers from above through a Webster heater, while between the feed pumps and Ross heater are vacuum pumps 10 in. x 14 in. x 20 in., which receive the condensed water from the steam return pipes and maintain a vacuum of 10 in. The air compressors are electrically driven and supply a pressure of 110 lbs., which can be reduced to the point necessary to operate the various valves.

Such is the plant required to perform the large amount of work demanded at the end of a tunnel nearly a mile long in which the *mains* are laid some



Hot Water Pipes for Domestic Water Supply to House of Commons

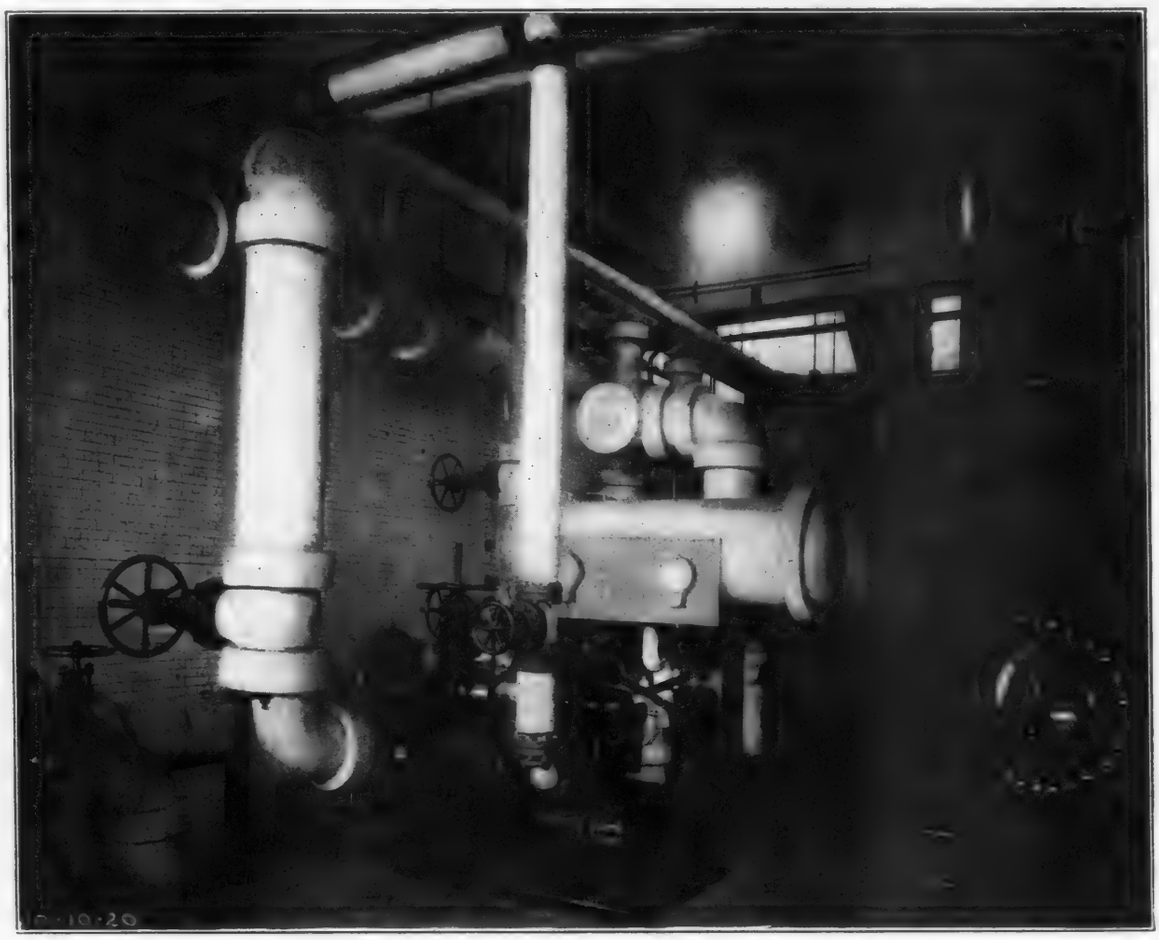
6 ft. beneath the surface of the ground. The Parliament Buildings are chiefly supplied with water radiators, supplied directly from the mains; but the Commons Chamber, Senate and corridors and larger offices, such as the stenographers' room, have, in addition, an indirect heating system of fresh air supplied by means of fans.

INDIRECT HEATING EQUIPMENT

The indirect heating equipment is in the basement of the Parliament Buildings and gets its steam supply from the steam main from the power house. This consists of fans and air washer from which several main warm-air ducts are taken off. There are 17 fans on the delivery ducts and 10 exhaust fans on the returns, while the total surface of the Vento heaters is 10,341 sq. ft. A total of 145,000 cu. ft. of air is delivered per minute and the guaranteed number of changes of air in the chambers is six times per hour.

The treatment of the fresh outer air which is drawn in at the ground level from a square area between walls of some 20 ft. square at the top of the cliff of the great river valley is the usual one of being drawn over preheating coils and then through a spray, or air washer, supplied by the Canadian Blower and Forge Company. From the humidifiers the air passes over another coil, if required, which raises it to the proper room temperature and humidity.

The delivery of the air into the Commons Chamber is by registers in the wall some 16 ft. from the floor, with exhaust ducts near the floor below. The space is under the gallery and is curtained to prevent any noticeable draft at the inlets. In the Senate a similar series of registers from the large delivery duct behind them so distributes the inlet flow of air that these, with the exhausts below them, are sufficient to prevent any disagreeable drafts on those near by, if delivered just above 70° F. The success of the ventilating system is seen



View in Parliament Buildings Power House, Showing Water Heaters and Circulating Equipment

in the following records taken from an average day's work:

OPERATION OF VENTILATING SYSTEM

A chart of the temperature and humidity of the House of Commons Chamber, March 18, 1926, showed a temperature range less than 1° change from 67° F.; while the relative humidity chart steadily read 47%.

Similarly, in the Stenographers' Room, with some 60 occupants, the air is kept at a temperature of 67° F. and supplies 2000 cu. ft. per hour per person of fresh air at 55% R.H. from hour to hour. The corridors throughout the great building receive their fresh air from registers placed in quiet places

behind pillars, and seem so airy and fresh as to make one imagine he is in the spacious galleries of the Mammoth Cave of Kentucky.

Such, then, is what may be accomplished by the application of correct scientific methods to an enormous installation. A whole wide area of building space is completely relieved of the smoke and dust seen on the main street just below Parliament Hill, from dozens of sooty chimneys in tall business blocks burning soft coal. The example is both a lesson and an inspiration. It is looked upon as the initiation of a complete scheme for the business district of Ottawa, when the Central Railway Station will have its trains brought in by electric motors, and the several long business blocks will be heated and ventilated by a system similar to that described.

Practical Notes on Ventilating Design

By Ernest C. Whitaker

AN architect recently asked me, "Now, honestly, do you really believe that these expensive ventilating systems are any good?" Truthfully I had to reply, "In many, many instances they have been frightfully bad, but properly thought out and constructed, they are a source of pride to the owner, the architect and the engineer."

There have been, and are, poor ventilating systems of many types, and there naturally are reasons for such, among which are lack of study of the problem, lack of co-operation with the architect, and a common engineering conceit that anything we design is too sacred to be criticized.

If we will study each past fault, and anticipate and plan to prevent every possible failure, we have gained a step in competence. If we will admit to ourselves that our great and glorious knowledge is colossally over-balanced by our ignorance, we have not only gained in genuine self-respect, but we will find that the architect, who was so aggravatingly uninterested, has suddenly become anxious to give us all possible help to make our work, and his, a success.

Let us not, however, become so stampeded by the knowledge of our ignorance that we accept as erroneous all that has been accomplished in the past, and proceed to rush blindly from this new system to that, because really, there is nothing new under the sun.

Each type of system has its place, and also its limitations, and each must be intelligently designed to be efficient. Permit me then, to offer a suggestion or two which may help to assure ventilating apparatus for which we need not apologize.

THE DUPLEX CENTRAL FAN SYSTEM

Let us consider the well-known duplex central fan system, with air delivered to the room through registers high in the wall, and with air exhausted through registers at the floor. The first step is to insure each branch duct to register its proper supply of air.

The ordinary system will include a main supply duct, deviating in its course, to conform to the contour of the building, and with branch ducts to the several registers, as shown in Fig. 1.

It will be noticed that there are located, beyond the turns, branch ducts on either side of the main duct. These branches are fitted with deflectors, intended to scoop up the air and divert it into the branch, but too frequently the branch on the inside of the turn does not receive its supply of air, even with the help of these deflectors.

The reason is readily seen. If the main duct be the same size throughout, ignoring friction, the velocity of the air should be the same after rounding the turn. You will find, however, that the course of the air is very similar to that of running water in a twisting brook, in that in rounding a turn, the flow is to the outside of the curve, where it becomes very swift.

The tendency, then, is for all of the air to hug, let us say, the outside half of the elbow, and if the entire quantity of air fills one half of the duct, the velocity would tend to double.

The result is that there is no air movement (or perhaps an eddy) beyond the inside of the turn, and branch *c* will deliver no air, while branch *d* delivers air at much too high a velocity, even with its deflector almost closed.

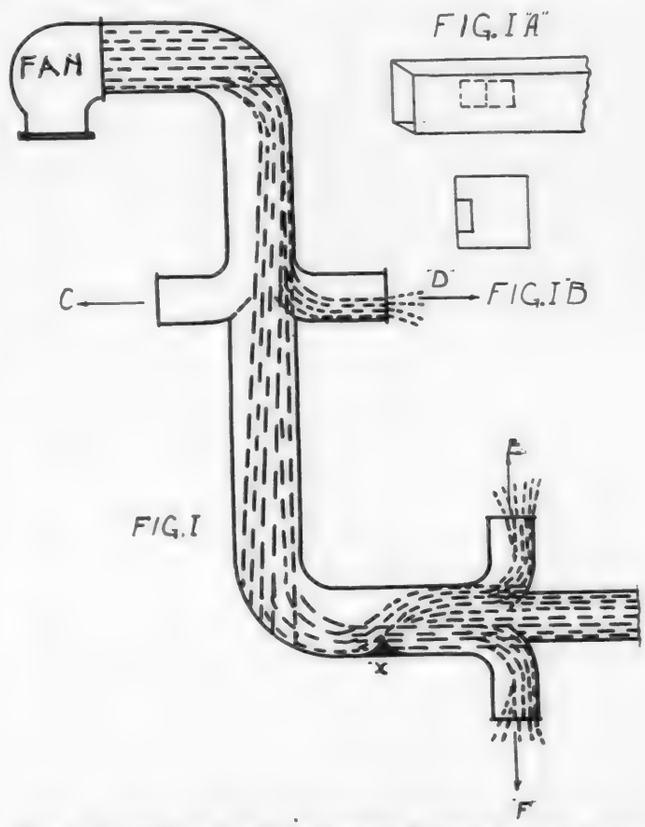


Fig. 1—Course of Air in Ventilating System Showing How Diverter at "X" is Used to Diffuse Air Current

Let the air continue to the next curve, and to branches *e* and *f* beyond. These branches receive all of the air for which they were designed. Why? Because we have placed, beyond the second turn, at *x* a "diverter," a curved V-shaped device, which sends part of the air across the duct, with a rolling motion, so that the air beyond this point immediately becomes mixed and diffused, and fills the whole duct.

This device, as shown in elevation *Ia* and section *Ib*, is situated in the middle vertical third of the duct, and projects into the duct but a very slight distance, varying with the size of the duct.

The air in the bottom third and top third of the duct passes straight by the diverter, while the middle third is diverted, the two currents mix, and branch ducts beyond, on both sides of the main duct, receive their supply of air.

The air now has passed into the branches and thence to the vertical risers leading to the registers. The air may be blown upward in these risers, from the basement, or perhaps downward from the roof.

AIR FLOW IN A TYPICAL ROOM

Let us consider that we have a room 12 ft. high, with registers placed as shown in Fig. 2, the top of the supply register being 2 ft. below the ceiling.

The air leaves the register, and is diverted downward by the register valves, placed as shown, or, if there are no register valves, the air may leave the register in a slightly upward direction. It meets, however, the bank of air above the register level, which diverts the current downward, where it is still further diverted downward by the air

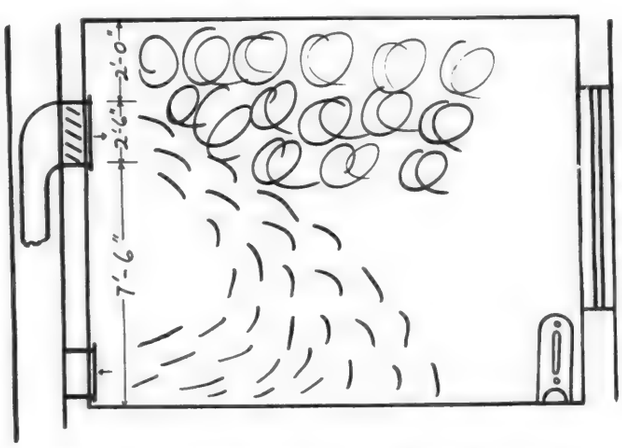


Fig. 2—Air Circulation in Room with Deflectors in Downward Position

which it continues to encounter, until it finds a complaining victim in the middle of the room.

Yes, you have met this condition, and so have I, and we have attempted to convince the complainer that he was the victim of imagination, for, you remember, our system must not be criticized. Let it be known, too, that because the air was warm is no reason why it does not feel cold, for moving air at 75° or 80° may feel cold.

A SUGGESTED SOLUTION

Two solutions suggest themselves, and they are very simple. First, the location of the register, and second, the direction of the valves. The register should be placed at the ceiling, or as near to the ceiling as possible.

The air then leaving the register encounters no diverting bank of air to alter its course, but will

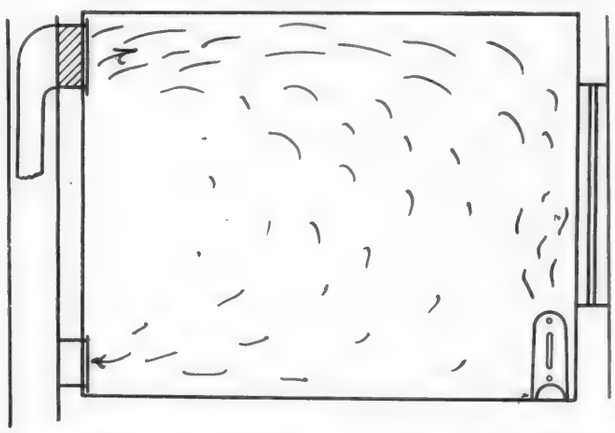


Fig. 3—Suggested Solution of Improper Room Circulation

follow the ceiling, dropping gradually and partially, as shown in Fig. 3, changing the air throughout the room, with an absence of drafts.

It will be seen that if the air is delivered from the roof, even this correct location of the register, will not prevent drafts, for the natural direction of the air would then be downward.

REGISTER DAMPERS SHOULD BE HORIZONTAL WHEN REGISTER IS IN PLACE

It is imperative, then, that all registers be specified to be made with valves which shall be horizontal when the register is in place, and shall close with an upward slant, so that if a register is but partially opened, its deflecting effect will be upward. This is particularly necessary in the case of lock pattern registers, which are frequently locked partially open, and in the case of low-studded rooms.

Registers, as a rule, are made standard, with the valves running the long way of the face. When such registers are installed vertically, it will be seen that the valves are in a vertical position, and their deflecting effect is sidewise, which permits the air to drop too soon, and helps one sufferer only at the expense of another.

The foregoing suggestions are not based upon theory alone. We all have experienced the fault, and I have successfully eliminated it by following these rules.

No type of air supply system is without possibility of troublesome defects, but trouble is to be avoided, not by changing from one type to another, but rather by studying the minor details which may, if overlooked, spoil any system.

This is the eighteenth lesson of The Heating and Ventilating Magazine's

New Home-Study Course in Gravity Steam and Water Heating

Lesson No. 18

By Ara Marcus Daniels

IN the preceding discussion and problems relating to the flow of steam through pipes, only straight lengths of pipe were considered. It is absolutely essential, when solving problems involving the flow of steam in pipes, in place of using the length as measured, that the equivalent length be used.

EFFECT OF PIPE FITTINGS, VALVES, ETC., UPON STEAM FLOW

Pipe fittings and valves in pipe lines introduce frictional resistance in excess of that for the same length of straight pipe. This additional resistance must be taken into account when establishing the length factor for steam-flow computations and when so considered in conjunction with the measured length, the equivalent length of run is obtained.

If allowance is not made for the effect of ells, tees, and valves, the pressure drop may be so much greater than for the same length of run without fittings that an otherwise correctly designed steam system might fail to function properly.

In making allowance for tees in the line, no additional length need be included where the flow is directly through the tee. Where the length of run involves a flow through the side outlet, the proper equivalent length from Table S-3-1 should be included.

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TABLE S-3-1
EQUIVALENT LENGTH TO BE ADDED TO PIPING LENGTH FOR VARIOUS FITTINGS

Size of Pipe	Standard Elbow	Side Outlet Tee	Gate Valve	Globe Valve	Angle Valve
	Length in Feet to be Added				
2	5	16	2	18	9
2½	7	20	3	25	12
3	10	26	3	33	16
3½	12	31	4	39	19
4	14	35	5	45	22
5	18	44	7	57	28
6	22	50	9	70	32

Work Problem S-3-1

While it is obviously impossible to present equivalent length of pipe for valves and other fittings that would be correct for all valves or fittings of the same size, since patterns of different manufacturers differ, yet a table of mean equivalent lengths may be used with satisfactory results.

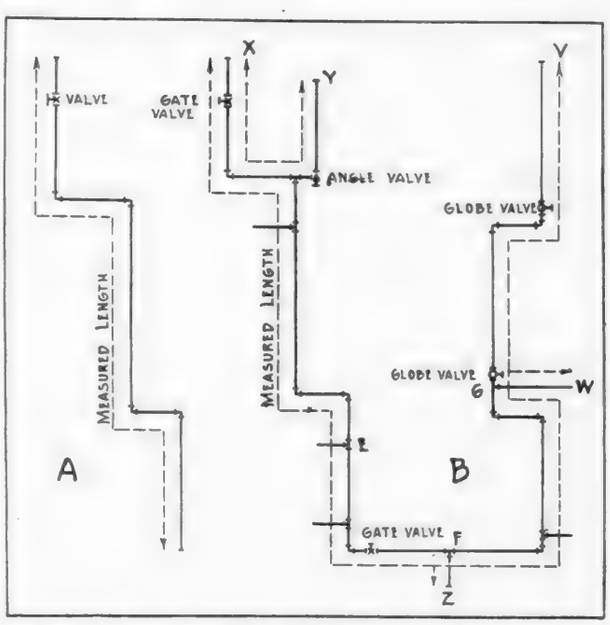


Fig. S-3-1 Pipe Runs Used in Calculation for Equivalent Lengths of Pipe

Table S-3-1 contains lengths of pipe in feet that should be added to the measured length of a run to obtain equivalent length. It is applied as follows for pipe run A of Fig. S-3-1 for a pipe diameter of 2½in.

Measured length of run, in feet	124 ft.
Equivalent length for one 2½-in. gate valve	3 ft.
Equivalent length for four 2½-in. elbows	28 ft.
Total Equivalent Length	155 ft.

Work Problems S-3-2, S-3-3, S-3-4

PIPE CAPACITIES FOR STEAM HEATING

The material presented in the preceding lesson, on the flow of steam in pipes should be considered as a steam-supply problem, while the sizing of a system of piping throughout a building is properly termed a steam-distribution problem. The first is to get the steam, in sufficient quantity, to a place where it may be used, while the second is to provide proper means for using it. The first part of the problem relates mainly to medium and large installations. The second part of the problem relates to the small, medium and large installations.

Velocity of steam flow is a part of the problem of steam supply and a vital part of that of steam distribution. In the case of steam supply, the velocity of flow depends upon the drop in pressure between the ends of the flow line and, therefore, may have a fairly wide range. In the case of steam distribution, the velocity is limited by what is known as the critical velocity. This velocity for a given size pipe and conditions attending the use of steam through that pipe is that which will not be high enough to hinder proper separation of the water of condensation from the steam and the flow of each of the quantities in such manner as to assure uniform circulation.

If the critical velocity is exceeded in the smaller mains, branches, and other piping, water hammer will occur. Critical velocity also bears consideration in larger supply mains, for if steam mains are carrying maximum loads and the steam is flowing at a velocity very much above the critical velocity, the water, instead of draining from the main through drips located at regular intervals, will be carried along and driven into the branch lines. It is therefore important that velocities always be considered.

Work Problem S-3-5

The following velocities for the conditions stated are considered good practice: 16 ft. per second for supply mains, branches, and risers where the condensation and steam are flowing in opposite directions, or for one-pipe up-feed risers; 10 to 20 ft. per second for radiator branches, the lower value being used for small and the higher for the larger pipe sizes where the length does not exceed 5 ft.; 10 ft. per second for radiator branches between 5 and 10 ft. long.

Work Problem S-3-6

SELECTING PIPE SIZES

The sizing of pipes for a steam heating system embodies a consideration of many factors and the size selected is in turn controlled by definite considerations.

The radiator gives off or emits heat in proportion to the quantity (pounds) of steam that is condensed in unit time, sufficient steam must be de-

TABLE S-3-2

CAPACITIES OF PIPES IN SQUARE FEET DIRECT RADIATION

BASED ON 100 FT. OF STRAIGHT PIPE OR EQUIVALENT AND 1/4 LB. CONDENSATION PER SQ.FT. PER HOUR

PRESSURE LOSS OZ. PER 100 FT.	PIPE SIZE - INCHES											
	3/4	1	1 1/4	1 1/2	2	2 1/2	3	3 1/2	4	4 1/2	5	6
0.25	12	23	51	79	158	262	480	717	1014	1379	1887	3078
0.50	16	32	71	111	224	370	678	1013	1433	1949	2667	4352
1.00	23	46	101	157	316	524	959	1431	2027	2757	3773	6156
1.50	28	56	124	192	387	641	1174	1754	2481	3374	4618	7535
2.00	32	64	142	222	447	741	1356	2026	2866	3898	5334	8704
2.50	36	73	160	248	500	829	1517	2266	3205	4358	5964	9732
3.00	39	79	175	272	548	908	1662	2482	3511	4774	6534	10662
3.50	43	86	189	293	591	980	1794	2680	3790	5155	7055	11511
4.00	46	91	202	314	632	1048	1919	2886	4054	5513	7543	12312
4.50	48	97	214	333	671	1111	2035	3039	4299	5847	8002	13047
5.00	51	102	226	351	707	1172	2145	3204	4532	6164	8435	13747
6.00	56	112	247	384	774	1283	2349	3509	4964	6751	9349	15346
7.00	60	121	267	415	836	1386	2537	3790	5361	7281	9961	16248
8.00	64	129	286	443	894	1482	2713	4052	5732	7796	10667	17407
9.00	68	137	303	470	949	1572	2878	4299	6012	8167	11223	18337
10.00	72	145	319	496	1000	1657	3033	4532	6410	8716	11928	19464
11.00	76	152	335	520	1049	1738	3181	4721	6707	9101	12211	20317
12.00	79	159	350	543	1095	1815	3334	4963	7020	9548	13068	21324
13.00	82	165	364	565	1140	1889	3461	5161	7308	9929	13589	22168
14.00	85	172	378	587	1183	1960	3588	5360	7580	10310	14110	23012
15.00	88	178	391	607	1226	2029	3713	5546	7843	10668	14598	23819
16.00	91	184	404	627	1265	2096	3838	5732	8108	11026	15086	24624

ivered to the radiator in unit time so that the atent heat of evaporization available from that condensed will meet requirements; the pressure at the boiler and pressure drop between boiler and radiator must be such (for the size pipe used) as o assure the necessary amount of steam being delivered and the piping must be amply large to permit this quantity to flow to the radiator and water to flow from the radiator in an even, quiet and proper manner.

Rate of condensation in radiators, total pressure drop between the boiler and the farthest radiator and the size and grading of pipe thus become most important factors.

Steam radiators under normal operating conditions are considered to condense 0.25 lb. of steam per square foot per hour and this value is taken as the basis upon which to establish tables for selecting pipe sizes.

A total pressure drop of not more than 2 oz. between the boiler and the farthest radiator is considered good practice.

The grade of mains and branches should be not less than as given in the following tabulation:

	Grade, Inches per	Feet
Supply Mains	1	20
Wet Return Mains	1	20
Dry Return Mains	1	20
Horizontal Branches	1	5

Supply mains should be no smaller than 2 in. (except in vary rare instances). A supply main greater than 2½ in. at the boiler should be no smaller than 2½ in. at its end.

The following are recommended as minimum sizes of pipe to use for mains and risers as stated:

	Pipe Size, In. Diam.
Dry return mains	1
Wet return mains	1¼
Supply risers	1
Return risers	¾

Work Problem S-3-7

SELECTING STEAM PIPE SIZES

In the preceding consideration of the flow of steam in pipes and the selection of a pipe size, it was presupposed that the quantity of steam required was known, as well as the other necessary factors. In designing steam mains for large installations, calculations invariably involve quantities of steam required. For strictly steam heating layouts of small and medium size, the actual quantity of steam required, expressed as such, is seldom determined. The latent heat available in the steam is used in the radiator and the size or area of the radiators has been established to meet the heating requirements. Therefore, a selection of pipe sizes based on the radiating surface supplied becomes the logical method of performing such work. Pressure losses, however, affect materially the amount of radiation that may be supplied by a given size pipe.

TABLE S-3-3

RADIATOR VALVE SIZES REQUIRED

Square Feet Radiation	Valve Size Inches
1 TO 24	1
25 TO 60	1¼
61 TO 100	1½
101 TO 200	2

TABLE S-3-4

ARMS, SMALL BRANCHES AND UP-FEED RISERS TO RADIATORS

Square Feet Radiation	Pipe Size Inches	
	1 TO 5 FT.	5 TO 10 FT.
1 TO 24	1	1¼
25 TO 60	1¼	1½
61 TO 100	1½	2
101 TO 200	2	2

TABLE S-3-5

STEAM MAINS (NOT OVER 100 FT.) LARGE BRANCHES (DRIPPED) WATER AND STEAM FLOW IN SAME DIRECTION

Square Feet Radiation	Pipe Size Ins.
1 TO 40	1
41 TO 75	1¼
76 TO 150	1½
151 TO 300	2
301 TO 500	2½
501 TO 900	3
901 TO 1500	3½
1501 TO 2000	4
2001 TO 3600	5
3601 TO 6000	6

TABLE S-3-6

STEAM MAINS (NOT OVER 100 FT.) LARGE BRANCHES (NOT DRIPPED) UP-FEED RISERS WATER AND STEAM FLOW IN OPPOSITE DIRECTIONS

Square Feet Radiation	Pipe Size Ins.
1 TO 40	1
41 TO 75	1¼
76 TO 100	1½
101 TO 170	2
171 TO 220	2½
221 TO 340	3
341 TO 460	3½
461 TO 600	4

Best practice in the design of steam mains permits a drop in pressure of 1 oz. per 100 ft. of straight pipe. Satisfactory results for all average installations may be expected when the total pressure drop between the boiler and the farthest radiator is not over 2 oz.

Table S-3-2 by R. V. Frost shows capacities of pipes in square feet of radiation per 100-ft. run on the basis of a condensation of 0.25 lb. of steam per square foot of direct radiation per hour, with allowance for condensation in covered piping and steam and water flowing in the same direction. This table may be used in several ways.

Thus, if the pressure drop is 1 oz. and the total direct steam radiation is 900 sq. ft., since the radiation value lies on the 1-oz. pressure-drop line between the values for a 2½-in. and 3-in. pipe, respectively, the larger size pipe or 3-in. will be required.

Work Problem S-3-8

Also, if a 4-in. pipe is available and a pressure drop of 2 oz. is allowed, by reading the value on the 2-oz. line under the 4-in. pipe, it is noted that 1356 sq. ft. of direct radiation may be supplied.

Work Problem S-3-9

Also, if a 2½-in. pipe is supplying 775 sq. ft. of direct radiation, by following down the vertical column for 2½-in. until the lowest value above 775 is reached, which is 829 sq. ft., the equivalent pressure-drop may be read on the horizontal line of 2.5 oz.

TABLE S-3-7

DRIPS FOR RISERS		
STEAM RISER SIZE	DRIP SIZE TO RETURN	
	WET	DRY
1	3/4	3/4
1 1/4	3/4	3/4
1 1/2	3/4	1
2	1	1
2 1/2	1	1 1/4
3	1	1 1/4
3 1/2	1 1/4	1 1/2
4	1 1/4	1 1/2

TABLE S-3-8

RETURN MAINS				
SQUARE FEET RADIATION			WET	DRY (NOT OVER 400 FT.) GRADE NOT LESS THAN 1 IN. TO 30 FT.
1	TO	180	-	3/4
181	TO	420	1	1
421	TO	800	1	1 1/4
801	TO	900	1 1/4	1 1/4
901	TO	1500	1 1/4	1 1/2
1501	TO	1800	1 1/4	2
1801	TO	3000	1 1/2	2
3001	TO	4900	2	2 1/2
4901	TO	6000	2	3
6001	TO	9000	2 1/2	3
9001	TO	10000	2 1/2	3 1/2
10001	TO	13000	3	3 1/2
13001	TO	18000	3	4
18001	TO	26000	3 1/2	-
26001	TO	37000	4	-

Work Problem S-3-10

Since Table S-3-2 is based on a length of 100 ft., to use the table for any other length, a correction must be applied. Correction factors are contained in Column 4 of Table S-2-1. Consequently, if a 3-in. steam main is 120 ft. long and its capacity for a pressure-drop of 2 oz. is desired, the correction factor of 0.912, from Table S-2-1, indicates a capacity of

1356 (sq. ft. from Table S-3-2) x 0.912 (from Table S-2-1) = 1237 sq. ft.

Work Problem S-3-11

Or, if the pressure loss and capacity of a 2½-in. pipe 140 ft. long, supplying 800 sq. ft. of direct radiation, is desired, it may be found by multiplying the pressure-loss per 100 ft. (in this case 2.5 oz.) by the length of pipe in feet, divided by 100. Thus 2.5 x 1.40 = 3.5 oz.

Work Problems S-3-12, S-3-13

SIZING PIPES BY QUANTITY OF RADIATING SURFACE

Where the amount of radiating surface required is known, it is quite easy to proportion the piping by means of tables. Tables S-3-3 to S-3-8 were prepared for this purpose. However, before a table can be used intelligently, one should have a thorough knowledge of the basis of the computations from which it was made.

These tables have been calculated on the assumption that water occupies one-eighth the area of the pipe. In Table S-3-3 is given the size of valves for radiators connected up as one-pipe work. The sizes are based on standard practice for one-pipe systems.

In Table S-3-4 the size of horizontal runouts to radiators should be taken. They are based on velocities ranging from 10 to 19 ft. per second depending upon the size of the branch—the smaller branches having the lower velocities. Branches from 5 to 10 ft. long are based on a velocity of approximately 10 ft. per second. Condensation is assumed as flowing counter to the steam.

Table S-3-5 is based on a pressure drop of 1 oz. per 100 ft. of pipe or equivalent.

Table S-3-6 is based on a velocity of 16 ft. per second.

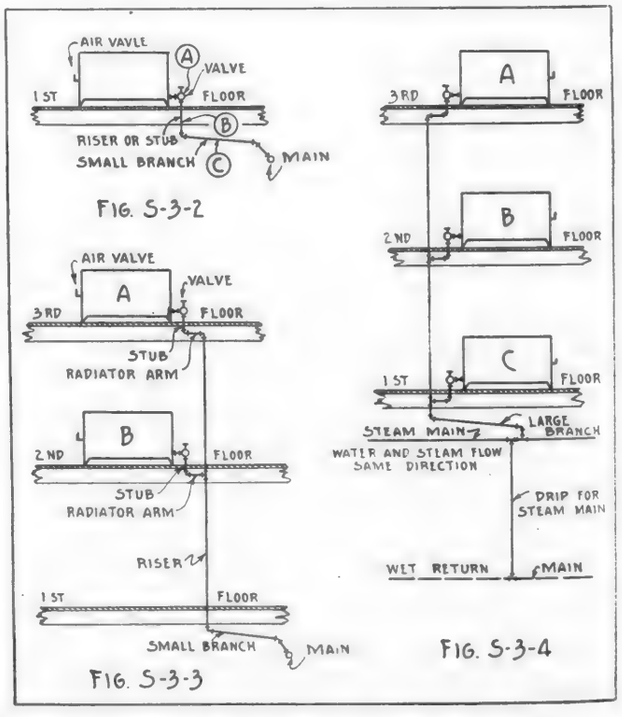
Table S-3-7 is calculated by the Chezy formula for flow in open conduits.

Table S-3-8 is calculated on a drop of ½ oz. per 100 ft. length of pipe or equivalent.

SIZING PIPES FOR ONE-PIPE WORK

Tables S-3-3 to S-3-8, inclusive, are suited to one-pipe steam distribution problems.

Fig. S-3-2 shows a first-floor radiator as it might be connected for one-pipe work. Knowing the radiating surface of this radiator there are three sizes of pipe to be established between the main and the branch. Tables S-3-3 and S-3-4 should be used. If the radiator contains 50 sq. ft. of surface, the valve size A, by Table S-3-3, should be 1¼ in.; the riser and branch C, by Table S-3-4, should be 1¼ in., unless the branch C should be longer than 5 ft., in which case the branch should be made 2 in. When the radiator is located on the first floor the riser or stub should be the same size as the valve it serves.



Typical Piping Connections for One-Pipe System.

Work Problem S-3-14

Fig. S-3-3 shows two radiators supplied by one up-feed riser. Tables S-3-3 and S-3-4 should be used for determining the sizes for the pipes and valves, bearing in mind that the size of the riser to the radiator arm for the second-floor radiator must be ample to supply both radiators, while above this point it carries steam for only one radiator. The stubs connecting the radiator valve to the radiator arm should be the same size as the valve.

Work Problem S-3-15

Fig. S-3-4 shows a section of a steam main in which steam and water flow in the same direction and the main is dripped at intervals into a wet return.

Tables S-3-3 and S-3-4 should be used for determining valve and all pipe sizes from the connection to the main as applied for Figs. S-3-2 and S-3-3, unless the radiation supplied by the branch exceeds 200 sq. ft. In that case, the branch size should be taken from Table S-3-5. To select a size for the steam main, Table S-3-5 should be used. If the total radiation of the three radiators amounts to 325 sq. ft., by this table, the steam main should be made 2½-in.

Work Problem S-3-16

Fig. S-3-5 shows three radiators connected to a steam main in which the steam and water flow in opposite directions. Valve and all pipe sizes from the main to the radiators should be determined by Tables S-3-3 and S-3-4 as previously applied unless the combined radiation is greater than 200 sq. ft., in which case, Table S-3-6 should be used for selecting the branch size. The size for the main should be taken from Table S-3-6, bearing in mind that it must be large enough to supply all radiators connected to it.

Work Problem S-3-17

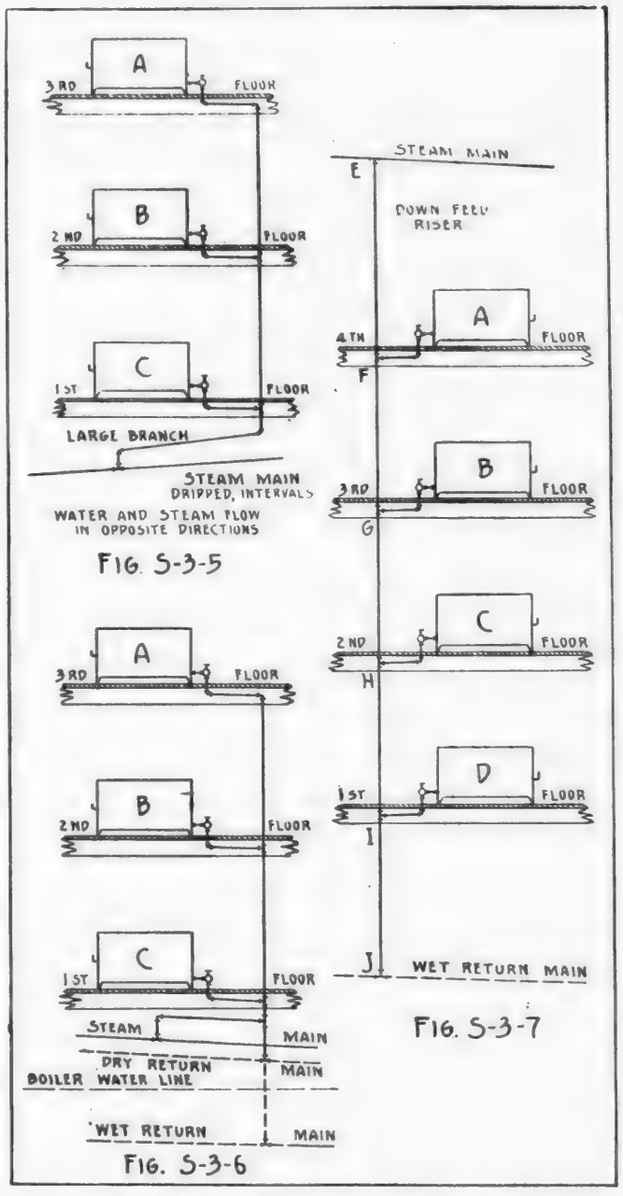
Fig. S-3-6 shows three radiators supplied by a single riser. In order to relieve the main of the condensation from the radiators, a separate drip is shown connected (by solid line) into a dry return and (by broken line) into a wet return. Table S-3-7 should be used for determining the size pipe to use for this drip connection, paying due attention to the kind of return main into which it delivers. All other pipe sizes should be selected as previously explained. Note that Table S-3-7 gives drip sizes in terms of steam riser size and not in terms of radiation.

Work Problem S-3-18

Return main sizes may be obtained from Table S-3-8.

Work Problem S-3-19

Tables S-3-5 and S-3-6 are applicable to supply mains not exceeding 100 ft. in length. If a supply main is longer than 100 ft., its capacity should be reduced accordingly by applying factors given in column 4 of Table S-2-1.



Layouts Used in Connection With One-Pipe Heating Problems

Work Problem S-3-20

Reference to Fig. S-2-4 shows that the risers are down-feed. Consequently each must carry steam sufficient to supply the radiators and the water of condensation therefrom. They may be proportioned by using Table S-3-5 and modifying the radiation as follows: Add to the radiation for which steam is to be supplied by the given length of pipe, one-fourth of that for which condensation must also be handled in the same pipe. Thus in Fig. S-3-7, the section of the down-feed riser from E to F will be sized by the amount of radiating surface for radiators A, B, C, and D; section FG for the radiating surface of B, C, and D increased by one-fourth of that of A, and so on. Section IJ will be sized as a drip for the combined radiation A, B, C, D.

The Heating and Ventilating Magazine

A Monthly Journal of Engineering Progress

MEMBER

National Publishers' Association
Associated Business Papers, Inc.
Audit Bureau of Circulations
National Trade Extension Bureau

VOL. 23 July, 1926 No. 7

Published Monthly at New York, N. Y., by the
HEATING AND VENTILATING MAGAZINE COMPANY

A. S. ARMAGNAC . . . . . President and Editor
GUSTAVE PETERSEN . Treasurer and Business Manager
P. E. FANSLER, ... Associate Editor
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Executive and Editorial Offices . . 1123 Broadway, New York

Western Office . . . . . 105 So. Dearborn St., Chicago
CLIFF W. PRESDEE, Manager

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Subscription	$2.00 per year
Canada	2.50 per year
Foreign Countries	3.00 per year
Back Numbers	50 cents each

ENCOURAGED no doubt by the success achieved in the elimination of the steam-type radiator, influential groups in the heating industry are applying themselves with confidence to the solution of other pressing problems, under the general heading of simplification, such as the whole question of variety in radiator types and sizes, boiler ratings, and sizes of pipe, valves and fittings. In the latter field alone it is estimated that a saving of several million dollars annually to consumers, distributors and manufacturers of wrought-iron and wrought-steel pipe, valves and pipe fittings will result through the adoption of a simplified list of standard sizes and the elimination of seldom-used sizes. At a recent conference in Washington, at the Department of Commerce, attended by users, makers and distributors, such a simplified list was adopted applying to standard weight, extra-heavy and double extra-heavy pipe. According to the agreement no less than 762 seldom-used and seldom-specified sizes of valves and fittings and 18 sizes of pipe will be thrown in the discard.

ALMOST on the heels of the announcement regarding pipe, valves and fittings comes the further news that a similar conference, attended by representatives of approximately 90% of the production of radiators of the country have set in motion a movement to reduce the variety in this item of heating equipment. As a first step in this direction the National Boiler and Radiator Manufacturers' Association has been requested to conduct a survey of the existing variations.

As is well known and as was brought out at the conference, the existing variety in radiators is due largely to the demands of architects and consulting engineers and is complicated by the heights of windows, types of building construction and similar features. One of the important points mentioned is the fact that there are lines which contribute as little as three-tenths of 1% of the total demand, while as much as 75% of the radiator business is confined to five or fewer sizes.

Just now, when still another class of radiators has made its appearance—the so-called invisible types—the radiator problem is rapidly becoming one of major importance.

Both of the foregoing movements, it should be stated, are part and parcel of the Hoover "Simplified Practice" program; each conference was held under the auspices of the Committee on Metal Utilization, Division of Simplified Practice of the Department of Commerce.

THE record would be incomplete without mention of the program of the heating contractors' Boiler Output Committee to simplify the selection of house-heating boilers. It is apparent that the plan set forth by the committee is acceptable to the bulk of the boiler manufacturers and there is every evidence that the impetus the movement has already gained will carry it along to a successful conclusion. House-heating boilers, in the future, will be rated on performance records, according to the Boiler Output Committee's formula and that will be an achievement which will rank high in the simplification movement.

AS far as gas heating boilers are concerned, it will be news to many to know that definite steps have been taken by the American Gas Association to standardize gas boilers and gas furnaces, with special reference to safety and uniform ratings. A committee, known as The Committee of Standardization of Central Gas House-Heating Appliances, is engaged on the project under the leadership of Eugene D. Milener, of Baltimore.

It is the purpose of the American Gas Association eventually to test every make of gas boiler and furnace. Those that meet the requirements of the code now being formulated by the committee will bear the seal of approval of the association's laboratory. One of the matters under consideration is an improved method of rating boilers and furnaces. The fact that a gas boiler or furnace has an absolutely constant B.T.U. input and, therefore, a constant B.T.U. output, it is expected will make it possible to devise a code that will place every make and model on a comparable basis.

National District Heating Association

Important Extensions of District Heating to Feature 1926

Recent Developments in Design of By-Product Heating Systems Hailed As Offering Attractive Possibilities When Operated in Close Relation with Electric Utilities

REPORTS of expenditures for extensions to heating systems in such centers as Detroit and Rochester, amounting in the aggregate to over $15,000,000, were received with enthusiasm at the seventeenth annual convention of the National District Heating Association in Niagara Falls, June 1-4, as convincing evidence of the brilliant prospects ahead for the industry. The development of by-product plant operation in Kansas City, Detroit, Pittsburgh and Rochester, N. Y., was taken as an indication of the trend in this field. The point was made that by-product heating systems, conservatively designed, offer attractive possibilities tending to lower prevailing rates for service or yielding greater net returns to the utilities. It was shown that, in general, this type of system is economically possible only by close relation with the local electric utilities and is distinctly ill-advised for independent companies in competition with the electric company. The generating equipment, it was stated, must be able to "float" on the distribution network of a larger electric system for best results. For that reason, electric companies, it was urged, should be solicited to adopt a more liberal viewpoint and to aid the heating utilities in establishing by-product heating on a better basis.

J. Earl Seiter,
President, National District Heating Association

MR. SEITER, has been identified with the district heating industry since 1914, when he undertook studies of long-distance gauges, remote-control valves and insulation of underground mains in the Research Department of the Detroit Edison Company. He also participated in the studies made on special problems in boiler design, operation and control. Since 1922, he has been engaged in practical work connected with district heating, his time being devoted largely to investigation and development of more economical methods of operation and design of heating systems using central station heating.

Mr. Seiter is a native of New Ulm, Minn., where he was born in 1894. He was a student at Cornell University, but left college at the opening of the World War to accept a commission in the Regular Army. He served in France as a Battery Commander in the 58th Artillery, which he trained and took to the front. After the War, he resumed his connection with the Detroit Edison Company, in the Research Department, and spent much time on boiler tests for the company, before assuming his present position.

Opening Session, June 1

With chilly blasts sweeping across the Gorge at Niagara, as if to provide a suitable setting for a gathering of heating men, President Earle Schultz called the convention to order Tuesday afternoon in the ballroom of the Hotel Niagara. He proceeded at once to the presentation of his address.

President's Address

President Schultz, in his address, discussed particularly the revival of interest in central station heating that has come about in the last two or three years. This interest, he said, has manifested itself by an increasing demand on the part of the owners of buildings in the congested districts of the larger cities for the convenience and service of central station heating. This has been brought about by the ever-increasing congestion in the downtown districts which not only makes coal and ash deliveries difficult and undersirable, but which also so increases the value of space that buildings can no longer afford to devote room to the non-productive generation of power.

As the result of this increasing demand, a number of the larger companies have made or are making quite large extensions to existing heating plants, and in one or two cities are developing what practically amounts to entirely new systems.

ELECTRIC HEATING COMPANIES TAKING NOTICE OF NEW CONDITIONS

Many electric companies, stated Mr. Schultz, which have small heating [illegible] partments that have been the [illegible] considerable loss during th[illegible]

pany reported 82,000 sq. ft. and the largest, 4,325,000 sq. ft., the average being 764,000 sq. ft. In 1925, the average came to 660,000 sq. ft., and in 1923, the average was 685,000 sq. ft.

In the matter of heating requirements, [illegible] sq. ft. The

systems, the committee's conclusions were:

"By-product heating systems, conservatively designed, offer attractive possibilities to lower prevailing rates for service or yielding greater net returns to the utilities.

[illegible] HIGH BACK-PRESSURE TURBINES

Justification of the installation of by-product systems in Rochester, Pittsburgh, Detroit and other cities was ascribed in the report largely to improved economy or low water rates in back-pressure turbines. This advance

PIPE CAPACITIES FOR STEAM HEATING

The material presented in the preceding lesson, on the flow of steam in pipes should be considered as a steam-supply problem, while the sizing of a system of piping throughout a building is properly termed a steam-distribution problem. The first is to get the steam, in sufficient quantity, to a place where it may be used, while the second is to provide proper means for using it. The first part of the problem relates mainly to medium and large installations. The second part of the problem relates to the small, medium and large installations.

Velocity of steam flow is a part of the problem of steam supply and a vital part of that of steam distribution. In the case of steam supply, the velocity of flow depends upon the drop in pressure between the ends of the flow line and, therefore, may have a fairly wide range. In the case of steam distribution, the velocity is limited by what is known as the critical velocity. This velocity for a given size pipe and conditions attending the use of steam through that pipe is that which will not be high enough to hinder proper separation of the water of condensation from the steam and the flow of each of the quantities in such manner as to assure uniform circulation.

If the critical velocity is exceeded in the smaller mains, branches, and other piping, water hammer will occur. Critical velocity also bears consideration in larger supply mains, for if steam mains are carrying maximum loads and the steam is flowing at a velocity very much above the critical velocity, the water, instead of draining from the main through drips located at regular intervals, will be carried along and driven into the branch lines. It is therefore important that velocities always be considered.

Work Problem S-3-5

The following velocities for the conditions stated are considered good practice: 16 ft. per second for supply mains, branches, and risers where the condensation and steam are flowing in opposite directions, or for one-pipe up-feed risers; 10 to 20 ft. per second for radiator branches, the lower value being used for small and the higher for the larger pipe sizes where the length does not exceed 5 ft.; 10 ft. per second for radiator branches between 5 and 10 ft. long.

Work Problem S-3-6

SELECTING PIPE SIZES

The sizing of pipes for a steam heating system embodies a consideration of many factors and the size selected is in turn controlled by definite considerations.

The radiator gives off or emits heat in proportion to the quantity (pounds) of steam that is condensed in unit time, sufficient steam must be de-

TABLE S-3-2

CAPACITIES OF PIPES IN SQUARE FEET DIRECT RADIATION

BASED ON 100 FT. OF STRAIGHT PIPE OR EQUIVALENT AND ¼ LB. CONDENSATION PER SQ.FT. PER HOUR

PRESSURE LOSS OZ. PER 100 FT.	PIPE SIZE - INCHES											
	¾	1	1¼	1½	2	2½	3	3½	4	4½	5	6
0.25	12	23	51	79	158	262	480	717	1014	1379	1887	3078
0.50	16	32	71	111	224	370	678	1013	1433	1949	2667	4352
1.00	23	46	101	157	316	524	959	1431	2027	2757	3773	6156
1.50	28	56	124	192	387	641	1174	1754	2481	3374	4618	7535
2.00	32	64	142	222	447	741	1356	2026	2866	3898	5334	8704
2.50	36	73	160	248	500	829	1517	2266	3205	4358	5964	9732
3.00	39	79	175	272	548	908	1662	2482	3511	4774	6534	10662
3.50	43	86	189	293	591	980	1794	2680	3790	5155	7055	11511
4.00	46	91	202	314	632	1048	1919	2886	4054	5513	7543	12312
4.50	48	97	214	333	671	1111	2035	3039	4299	5847	8002	13047
5.00	51	102	226	351	707	1172	2145	3204	4532	6164	8435	13747
6.00	56	112	247	384	774	1283	2349	3509	4964	6751	9349	15346
7.00	60	121	267	415	836	1386	2537	3790	5361	7281	9961	16248
8.00	64	129	286	443	894	1482	2713	4052	5732	7796	10667	17407
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10.00	72	145	319	496	1000	1657	3033	4532	6410	8716	11928	19464
11.00	76	152	335	520	1049	1738	3181	4721	6707	9101	12211	20317
12.00	79	159	350	543	1095	1815	3334	4963	7020	9548	13068	21324
13.00	82	165	364	565	1140	1889	3461	5161	7308	9929	13589	22168
14.00	85	172	378	587	1183	1960	3588	5360	7580	10310	14110	23012
15.00	88	178	391	607	1226	2029	3713	5546	7843	10668	14598	23819
16.00	91	184	404	627	1265	2096	3838	5732	8108	11026	15086	24624

livered to the radiator in unit time so that the latent heat of evaporization available from that condensed will meet requirements; the pressure at the boiler and pressure drop between boiler and radiator must be such (for the size pipe used) as to assure the necessary amount of steam being delivered and the piping must be amply large to permit this quantity to flow to the radiator and water to flow from the radiator in an even, quiet and proper manner.

Rate of condensation in radiators, total pressure drop between the boiler and the farthest radiator and the size and grading of pipe thus become most important factors.

Steam radiators under normal operating conditions are considered to condense 0.25 lb. of steam per square foot per hour and this value is taken as the basis upon which to establish tables for selecting pipe sizes.

A total pressure drop of not more than 2 oz. between the boiler and the farthest radiator is considered good practice.

The grade of mains and branches should be not less than as given in the following tabulation:

	Grade, Inches per	Feet
Supply Mains	1	20
Wet Return Mains	1	20
Dry Return Mains	1	20
Horizontal Branches	1	5

Supply mains should be no smaller than 2 in. (except in vary rare instances). A supply main greater than 2½ in. at the boiler should be no smaller than 2½ in. at its end.

The following are recommended as minimum sizes of pipe to use for mains and risers as stated:

	Pipe Size, In. Diam.
Dry return mains	1
Wet return mains	1¼
Supply risers	1
Return risers	¾

Work Problem S-3-7

SELECTING STEAM PIPE SIZES

In the preceding consideration of the flow of steam in pipes and the selection of a pipe size, it was presupposed that the quantity of steam required was known, as well as the other necessary factors. In designing steam mains for large installations, calculations invariably involve quantities of steam required. For strictly steam heating layouts of small and medium size, the actual quantity of steam required, expressed as such, is seldom determined. The latent heat available in the steam is used in the radiator and the size or area of the radiators has been established to meet the heating requirements. Therefore, a selection of pipe sizes based on the radiating surface supplied becomes the logical method of performing such work. Pressure losses, however, affect materially the amount of radiation that may be supplied by a given size pipe.

TABLE S-3-3

RADIATOR VALVE SIZES REQUIRED

Square Feet Radiation	Valve Size Inches
1 TO 24	1
25 TO 60	1¼
61 TO 100	1½
101 TO 200	2

TABLE S-3-4

ARMS, SMALL BRANCHES AND UP-FEED RISERS TO RADIATORS

Square Feet Radiation	Pipe Size Inches	
	1 TO 5 FT.	5 TO 10 FT.
1 TO 24	1	1¼
25 TO 60	1¼	1½
61 TO 100	1½	2
101 TO 200	2	2

TABLE S-3-5

STEAM MAINS (NOT OVER 100 FT.) LARGE BRANCHES (DRIPPED) WATER AND STEAM FLOW IN SAME DIRECTION

Square Feet Radiation	Pipe Size Ins.
1 TO 40	1
41 TO 75	1¼
76 TO 150	1½
151 TO 300	2
301 TO 500	2½
501 TO 900	3
901 TO 1500	3½
1501 TO 2000	4
2001 TO 3600	5
3601 TO 6000	6

TABLE S-3-6

STEAM MAINS (NOT OVER 100 FT.) LARGE BRANCHES (NOT DRIPPED) UP-FEED RISERS WATER AND STEAM FLOW IN OPPOSITE DIRECTIONS

Square Feet Radiation	Pipe Size Ins.
1 TO 40	1
41 TO 75	1¼
76 TO 100	1½
101 TO 170	2
171 TO 220	2½
221 TO 340	3
341 TO 460	3½
461 TO 600	4

Best practice in the design of steam mains permits a drop in pressure of 1 oz. per 100 ft. of straight pipe. Satisfactory results for all average installations may be expected when the total pressure drop between the boiler and the farthest radiator is not over 2 oz.

Table S-3-2 by R. V. Frost shows capacities of pipes in square feet of radiation per 100-ft. run on the basis of a condensation of 0.25 lb. of steam per square foot of direct radiation per hour, with allowance for condensation in covered piping and steam and water flowing in the same direction. This table may be used in several ways.

Thus, if the pressure drop is 1 oz. and the total direct steam radiation is 900 sq. ft., since the radiation value lies on the 1-oz. pressure-drop line between the values for a 2½-in. and 3-in. pipe, respectively, the larger size pipe or 3-in. will be required.

Work Problem S-3-8

Also, if a 4-in. pipe is available and a pressure drop of 2 oz. is allowed, by reading the value on the 2-oz. line under the 4-in. pipe, it is noted that 1356 sq. ft. of direct radiation may be supplied.

Work Problem S-3-9

Also, if a 2½-in. pipe is supplying 775 sq. ft. of direct radiation, by following down the vertical column for 2½-in. until the lowest value above 775 is reached, which is 829 sq. ft., the equivalent pressure-drop may be read on the horizontal line of 2.5 oz.

TABLE S-3-7

DRIPS FOR RISERS		
STEAM RISER SIZE	DRIP SIZE TO RETURN	
	WET	DRY
1	3/4	3/4
1 1/4	3/4	3/4
1 1/2	3/4	1
2	1	1
2 1/2	1	1 1/4
3	1	1 1/4
3 1/2	1 1/4	1 1/2
4	1 1/4	1 1/2

TABLE S-3-8

RETURN MAINS				
SQUARE FEET RADIATION			WET	DRY (NOT OVER 400 FT.) GRADE NOT LESS THAN 1 IN. TO 30 FT.
1	TO	180	-	3/4
181	TO	420	1	1
421	TO	800	1	1 1/4
801	TO	900	1 1/4	1 1/4
901	TO	1500	1 1/4	1 1/2
1501	TO	1800	1 1/4	2
1801	TO	3000	1 1/2	2
3001	TO	4900	2	2 1/2
4901	TO	6000	2	3
6001	TO	9000	2 1/2	3
9001	TO	10000	2 1/2	3 1/2
10001	TO	13000	3	3 1/2
13001	TO	18000	3	4
18001	TO	26000	3 1/2	-
26001	TO	37000	4	-

Work Problem S-3-10

Since Table S-3-2 is based on a length of 100 ft., to use the table for any other length, a correction must be applied. Correction factors are contained in Column 4 of Table S-2-1. Consequently, if a 3-in. steam main is 120 ft. long and its capacity for a pressure-drop of 2 oz. is desired, the correction factor of 0.912, from Table S-2-1, indicates a capacity of

1356 (sq. ft. from Table S-3-2) x 0.912 (from Table S-2-1) = 1237 sq. ft.

Work Problem S-3-11

Or, if the pressure loss and capacity of a 2½-in. pipe 140 ft. long, supplying 800 sq. ft. of direct radiation, is desired, it may be found by multiplying the pressure-loss per 100 ft. (in this case 2.5 oz.) by the length of pipe in feet, divided by 100. Thus 2.5 x 1.40 = 3.5 oz.

Work Problems S-3-12, S-3-13

SIZING PIPES BY QUANTITY OF RADIATING SURFACE

Where the amount of radiating surface required is known, it is quite easy to proportion the piping by means of tables. Tables S-3-3 to S-3-8 were prepared for this purpose. However, before a table can be used intelligently, one should have a thorough knowledge of the basis of the computations from which it was made.

These tables have been calculated on the assumption that water occupies one-eighth the area of the pipe. In Table S-3-3 is given the size of valves for radiators connected up as one-pipe work. The sizes are based on standard practice for one-pipe systems.

In Table S-3-4 the size of horizontal runouts to radiators should be taken. They are based on velocities ranging from 10 to 19 ft. per second depending upon the size of the branch—the smaller branches having the lower velocities. Branches from 5 to 10 ft. long are based on a velocity of approximately 10 ft. per second. Condensation is assumed as flowing counter to the steam.

Table S-3-5 is based on a pressure drop of 1 oz. per 100 ft. of pipe or equivalent.

Table S-3-6 is based on a velocity of 16 ft. per second.

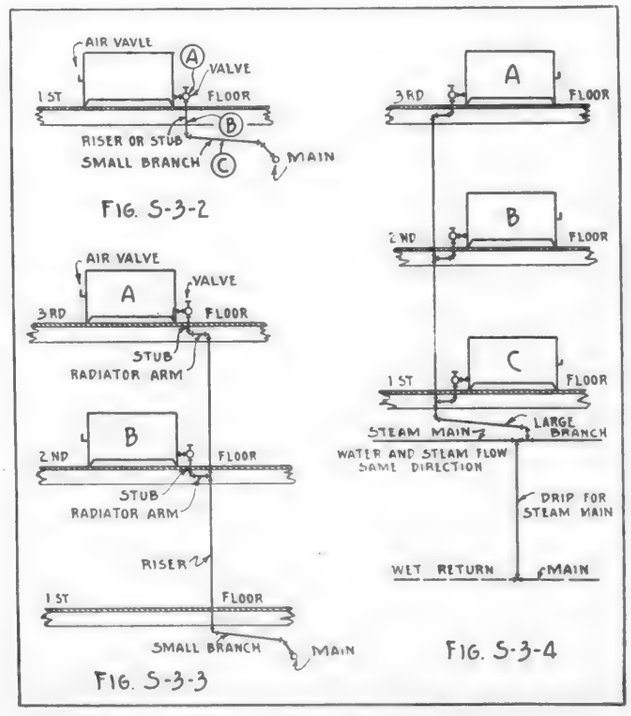
Table S-3-7 is calculated by the Chezy formula for flow in open conduits.

Table S-3-8 is calculated on a drop of ½ oz. per 100 ft. length of pipe or equivalent.

SIZING PIPES FOR ONE-PIPE WORK

Tables S-3-3 to S-3-8, inclusive, are suited to one-pipe steam distribution problems.

Fig. S-3-2 shows a first-floor radiator as it might be connected for one-pipe work. Knowing the radiating surface of this radiator there are three sizes of pipe to be established between the main and the branch. Tables S-3-3 and S-3-4 should be used. If the radiator contains 50 sq. ft. of surface, the valve size A, by Table S-3-3, should be 1¼ in.; the riser and branch C, by Table S-3-4, should be 1¼ in., unless the branch C should be longer than 5 ft., in which case the branch should be made 2 in. When the radiator is located on the first floor the riser or stub should be the same size as the valve it serves.



Typical Piping Connections for One-Pipe System.

Work Problem S-3-14

Fig. S-3-3 shows two radiators supplied by one up-feed riser. Tables S-3-3 and S-3-4 should be used for determining the sizes for the pipes and valves, bearing in mind that the size of the riser to the radiator arm for the second-floor radiator must be ample to supply both radiators, while above this point it carries steam for only one radiator. The stubs connecting the radiator valve to the radiator arm should be the same size as the valve.

Work Problem S-3-15

Fig. S-3-4 shows a section of a steam main in which steam and water flow in the same direction and the main is dripped at intervals into a wet return.

Tables S-3-3 and S-3-4 should be used for determining valve and all pipe sizes from the connection to the main as applied for Figs. S-3-2 and S-3-3, unless the radiation supplied by the branch exceeds 200 sq. ft. In that case, the branch size should be taken from Table S-3-5. To select a size for the steam main, Table S-3-5 should be used. If the total radiation of the three radiators amounts to 325 sq. ft., by this table, the steam main should be made 2½-in.

Work Problem S-3-16

Fig. S-3-5 shows three radiators connected to a steam main in which the steam and water flow in opposite directions. Valve and all pipe sizes from the main to the radiators should be determined by Tables S-3-3 and S-3-4 as previously applied unless the combined radiation is greater than 200 sq. ft., in which case, Table S-3-6 should be used for selecting the branch size. The size for the main should be taken from Table S-3-6, bearing in mind that it must be large enough to supply all radiators connected to it.

Work Problem S-3-17

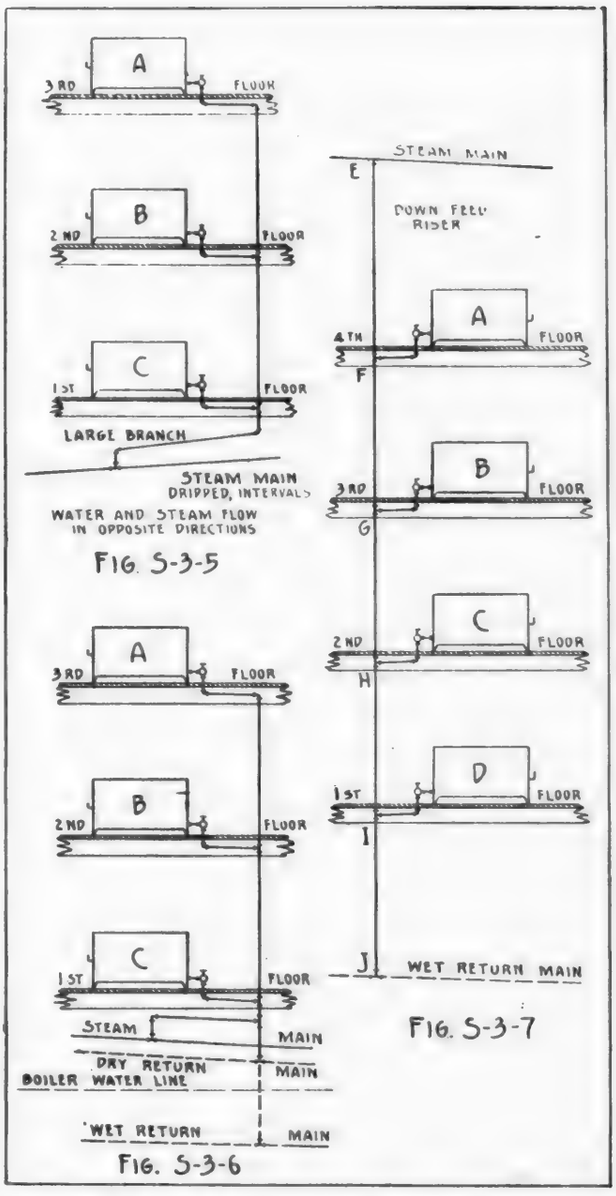
Fig. S-3-6 shows three radiators supplied by a single riser. In order to relieve the main of the condensation from the radiators, a separate drip is shown connected (by solid line) into a dry return and (by broken line) into a wet return. Table S-3-7 should be used for determining the size pipe to use for this drip connection, paying due attention to the kind of return main into which it delivers. All other pipe sizes should be selected as previously explained. Note that Table S-3-7 gives drip sizes in terms of steam riser size and not in terms of radiation.

Work Problem S-3-18

Return main sizes may be obtained from Table S-3-8.

Work Problem S-3-19

Tables S-3-5 and S-3-6 are applicable to supply mains not exceeding 100 ft. in length. If a supply main is longer than 100 ft., its capacity should be reduced accordingly by applying factors given in column 4 of Table S-2-1.



Layouts Used in Connection With One-Pipe Heating Problems

Work Problem S-3-20

Reference to Fig. S-2-4 shows that the risers are down-feed. Consequently each must carry steam sufficient to supply the radiators and the water of condensation therefrom. They may be proportioned by using Table S-3-5 and modifying the radiation as follows: Add to the radiation for which steam is to be supplied by the given length of pipe, one-fourth of that for which condensation must also be handled in the same pipe. Thus in Fig. S-3-7, the section of the down-feed riser from E to F will be sized by the amount of radiating surface for radiators A, B, C, and D; section FG for the radiating surface of B, C, and D increased by one-fourth of that of A, and so on. Section IJ will be sized as a drip for the combined radiation A, B, C, D.

The Heating and Ventilating Magazine

A Monthly Journal of Engineering Progress

MEMBER

National Publishers' Association
Associated Business Papers, Inc.
Audit Bureau of Circulations
National Trade Extension Bureau

VOL. 23 July, 1926 No. 7

Published Monthly at New York, N. Y., by the
HEATING AND VENTILATING MAGAZINE COMPANY
A. S. ARMAGNAC . . . . . President and Editor
GUSTAVE PETERSEN . Treasurer and Business Manager
P. E. FANSLER, ... Associate Editor
A. M. DANIELS, ... Contributing Editor

Executive and Editorial Offices . . 1123 Broadway, New York

Western Office . . . . . 105 So. Dearborn St., Chicago
CLIFF W. PRESDEE, Manager

European Representative
W. G. Hollinworth, 38, Victoria St., London, S.W.

Subscription	$2.00 per year
Canada	2.50 per year
Foreign Countries	3.00 per year
Back Numbers	50 cents each

ENCOURAGED no doubt by the success achieved in the elimination of the steam-type radiator, influential groups in the heating industry are applying themselves with confidence to the solution of other pressing problems, under the general heading of simplification, such as the whole question of variety in radiator types and sizes, boiler ratings, and sizes of pipe, valves and fittings. In the latter field alone it is estimated that a saving of several million dollars annually to consumers, distributors and manufacturers of wrought-iron and wrought-steel pipe, valves and pipe fittings will result through the adoption of a simplified list of standard sizes and the elimination of seldom-used sizes. At a recent conference in Washington, at the Department of Commerce, attended by users, makers and distributors, such a simplified list was adopted applying to standard weight, extra-heavy and double extra-heavy pipe. According to the agreement no less than 762 seldom-used and seldom-specified sizes of valves and fittings and 18 sizes of pipe will be thrown in the discard.

ALMOST on the heels of the announcement regarding pipe, valves and fittings comes the further news that a similar conference, attended by representatives of approximately 90% of the production of radiators of the country have set in motion a movement to reduce the variety in this item of heating equipment. As a first step in this direction the National Boiler and Radiator Manufacturers' Association has been requested to conduct a survey of the existing variations.

As is well known and as was brought out at the conference, the existing variety in radiators is due largely to the demands of architects and consulting engineers and is complicated by the heights of windows, types of building construction and similar features. One of the important points mentioned is the fact that there are lines which contribute as little as three-tenths of 1% of the total demand, while as much as 75% of the radiator business is confined to five or fewer sizes.

Just now, when still another class of radiators has made its appearance—the so-called invisible types—the radiator problem is rapidly becoming one of major importance.

Both of the foregoing movements, it should be stated, are part and parcel of the Hoover "Simplified Practice" program; each conference was held under the auspices of the Committee on Metal Utilization, Division of Simplified Practice of the Department of Commerce.

THE record would be incomplete without mention of the program of the heating contractors' Boiler Output Committee to simplify the selection of house-heating boilers. It is apparent that the plan set forth by the committee is acceptable to the bulk of the boiler manufacturers and there is every evidence that the impetus the movement has already gained will carry it along to a successful conclusion. House-heating boilers, in the future, will be rated on performance records, according to the Boiler Output Committee's formula and that will be an achievement which will rank high in the simplification movement.

AS far as gas heating boilers are concerned, it will be news to many to know that definite steps have been taken by the American Gas Association to standardize gas boilers and gas furnaces, with special reference to safety and uniform ratings. A committee, known as The Committee of Standardization of Central Gas House-Heating Appliances, is engaged on the project under the leadership of Eugene D. Milener, of Baltimore.

It is the purpose of the American Gas Association eventually to test every make of gas boiler and furnace. Those that meet the requirements of the code now being formulated by the committee will bear the seal of approval of the association's laboratory. One of the matters under consideration is an improved method of rating boilers and furnaces. The fact that a gas boiler or furnace has an absolutely constant B.T.U. input and, therefore, a constant B.T.U. output, it is expected will make it possible to devise a code that will place every make and model on a comparable basis.

National District Heating Association

Important Extensions of District Heating to Feature 1926

Recent Developments in Design of By-Product Heating Systems Hailed As Offering Attractive Possibilities When Operated in Close Relation with Electric Utilities

REPORTS of expenditures for extensions to heating systems in such centers as Detroit and Rochester, amounting in the aggregate to over $15,000,000, were received with enthusiasm at the seventeenth annual convention of the National District Heating Association in Niagara Falls, June 1-4, as convincing evidence of the brilliant prospects ahead for the industry. The development of by-product plant operation in Kansas City, Detroit, Pittsburgh and Rochester, N. Y., was taken as an indication of the trend in this field. The point was made that by-product heating systems, conservatively designed, offer attractive possibilities tending to lower prevailing rates for service or yielding greater net returns to the utilities. It was shown that, in general, this type of system is economically possible only by close relation with the local electric utilities and is distinctly ill-advised for independent companies in competition with the electric company. The generating equipment, it was stated, must be able to "float" on the distribution network of a larger electric system for best results. For that reason, electric companies, it was urged, should be solicited to adopt a more liberal viewpoint and to aid the heating utilities in establishing themselves on a better basis.

J. Earl Seiter,
President, National District Heating Association

MR. SEITER, has been identified with the district heating industry since 1914, when he undertook studies of long-distance gauges, remote-control valves and insulation of underground mains in the Research Department of the Detroit Edison Company. He also participated in the studies made on special problems in boiler design, operation and control. Since 1922, he has been engaged in practical work connected with district heating, his time being devoted largely to investigation and development of more economical methods of operation and design of heating systems using central station heating.

Mr. Seiter is a native of New Ulm, Minn., where he was born in 1894. He was a student at Cornell University, but left college at the opening of the World War to accept a commission in the Regular Army. He served in France as a Battery Commander in the 58th Artillery, which he trained and took to the front. After the War, he resumed his connection with the Detroit Edison Company, in the Research Department, and spent much time on boiler tests for the company, before assuming his present position.

By all odds, the most extensive program of papers and reports ever arranged was offered at the meeting. The trend in the by-product field was handled in an extensive report submitted by the Heating Research Committee, F. B. Orr, chairman. Prominent features of the Station Operating Committee's report were the use

Opening Session, June 1

With chilly blasts sweeping across the Gorge at Niagara, as if to provide a suitable setting for a gathering of heating men, President Earle Schultz called the convention to order Tuesday afternoon in the ballroom of the Hotel Niagara. He proceeded at once to the presentation of his address.

President's Address

President Schultz, in his address, discussed particularly the revival of interest in central station heating that has come about in the last two or three years. This interest, he said, has manifested itself by an increasing demand on the part of the owners of buildings in the congested districts of the larger cities for the convenience and service of central station heating. This has been brought about by the ever-increasing congestion in the downtown districts which not only makes coal and ash deliveries difficult and undersirable, but which also so increases the value of space that buildings can no longer afford to devote room to the non-productive generation of power.

As the result of this increasing demand, a number of the larger companies have made or are making quite large extensions to existing heating plants, and in one or two cities are developing what practically amounts to entirely new systems.

ELECTRIC HEATING COMPANIES TAKING NOTICE OF NEW CONDITIONS

Many electric companies, stated Mr. Schultz, which have small heating departments that have been the source of considerable loss during the past years, seeing that the larger companies are now operating their steam plants on a profitable basis, are now giving thought to the possibility of doing the same in their localities. This interest has focused the attention of many people on the problem of re-establishing central station heating on a basis that will yield a fair return on the investment in it

and, at the same time, effectively compete with the individual boiler plant.

INVESTMENT CHARGES AGAINST STEAM PRODUCTION MUST BE REDUCED

As Mr. Schultz stated, the Research Committee, in its report presented at the same session, showed that it had devoted its time to methods of reducing the investment charges against steam production. It has been found that, due to the low load factor, the investment cost of peak load steam is very excessive. This, of course, results in a high investment charge which must be borne by all of the output. The Research Committee, looking for a solution of this problem, has carefully examined the possibilities of the joint use of plant investment by the heating and electric departments. Also the Distribution Committee, in its report, has developed a complete theoretical distribution system and considered the effects of the various types of systems not only upon the operation of the systems, but also upon the investment costs in them.

SCIENTIFICALLY-CONSTRUCTED RATE SCHEDULE NEEDED

"One of the difficulties under which the heating business has been laboring," continued President Schultz, "has been the lack of a scientifically-constructed rate schedule having in it the various elements of load factor, investment charges and production costs. The Rates and Regulations Committee is presenting a very complete analysis of the factors which must be considered in a proper rate. The Station Operating Committee is also presenting the very latest plant developments, also having particularly in mind the desirability of designing stations at a reduced investment cost."

MANUAL ON "PRINCIPLES AND METHODS OF HEAT SAVING"

President Schultz then referred to the activities of the Heat Utilization Committee which has joined with the Research Committee of the National Association of Building Owners and Managers in the preparation of a comprehensive report on "Principles and Methods of Heat Saving." This report, he said, had been distributed to several thousand building owners and should not only stimulate the greater use of central station steam, but should build up between heating companies and their customers a much more friendly relation and a greater spirit of mutual service.

CENTRAL STATION HEATING SOUND IN PRINCIPLE

"The principal message which I wish to leave with the association," said Mr. Schultz, "is to urge that the splendid foundation for a rebuilding and enlargement of our utility be carried on by succeeding administrations and committees. Central station heating is entirely sound in principle and, when the financial and operating problems which have been holding it back are completely solved, I believe that its future will be just as prosperous as that of our parent utility, the generation of electricity."

of fuel oil by central heating stations, as well as air preheaters and their effect on boiler room economy.

An elaborate tentative draft of analysis of cost for steam heating companies was presented by John W. Meyer, of Philadelphia, who declared that the association, if it contemplates a conclusive consideration of the rate question, must establish a standard of the requirements of steam per square foot of radiation, connected or required, at a predetermined temperature. This figure, of course, is frequently taken at 0.3 lbs. of steam per square foot at zero temperature, but this will vary with different types of buildings and their location in a community. "By fixing the predetermined temperature factor," he stated, "we may establish a definition, whereby a comparison may be made of the demands of the same type or different types of buildings in different communities." The committee's draft, being in tentative form, was not made public, but will form the basis of a further study of the question, and it is hoped that, by the end of another year, an acceptable basis may be established.

As usual, the report on operating statistics for the year was full of interesting data and showed the growth of the industry.

Two of the association's most noteworthy achievements were the compilation of the booklet on "Principles and Methods of Heat Utilization", compiled by the Heat Utilization Committee, which will be distributed in quantities to building owners and managers and others interested in saving heat and in the widespread distribution of a pamphlet on "Office Ventilation". The association expects to issue no less than 500,000 copies of this pamphlet.

One of the most important reports at the convention was that of the Distribution Committee, which worked out, in an elaborate way, the design of three different piping layouts for the typical district heating system.

The meeting was one of the largest in the history of the association and was notable for its exhibition of enthusiasm and interest. A significant remark made by President Schultz toward the close of the convention, was that commercial, as well as practical, discussion will occupy a place of prominence in the association's proceedings, and that the advisability may well be considered of extending the membership further into the commercial field.

Secretary-Treasurer D. L. Gaskill in what was his seventeenth annual report, gave details of the association's activities for the past year. The receipts were $10,646.00 and the expenditures, $8,102.00, leaving a comfortable balance of $2,544.00 in the treasury at the close of the year. This is the best financial showing the society has made in its history. The membership, at the close of the year, consisted of 107 Class A members, 2 honorary, 86 Class B, 32 Class C, 5 Class D and 34 associates, totaling 266. Of the new names added to the roll during the year, almost all are district heating concerns.

"During the year," said Secretary Gaskill, "a fine spirit of co-operation has been developed between heating companies and building managers." In this connection, he stated, two publications of more than ordinary merit have been published by the association, one on "Office Ventilation," by Dr. Watt of Chicago, of which the first edition is 100,000 copies. It is the intention of the association to put out 500,000 copies to be distributed by building managers and heating companies in educating the public to methods of ventilating their rooms and, at the same time, of economizing on their steam consumption. The manuals are being sold at $6.00 per thousand copies.

Another publication of a non-technical character, which the association has compiled, is entitled, "Principles and Methods of Heat Saving." This manual is made up largely of the data developed by the Heat Utilization Committee, composed of J. E. Seiter, chairman, Earle Schultz and Secretary D. L. Gaskill. It is designed especially to reach janitors, building managers and all interested in the saving of heat. Copies of the first edition, of which 2500 have been printed, were distributed at the meeting and it was stated that another edition of 2500 has been ordered.

Of the association's Handbook, 90 copies were sold during the year. It is now the intention to publish the next edition of the Handbook in 1928, as there is not sufficient new matter available at this time for a new edition. The association's *Bulletin*, reported Secre-

tary Gaskill, showed a net profit for the year of $926.00. The cost of printing came to $652.00, while the advertising receipts amounted to $1558.00.

Technical-Secretary H. R. Wetherell stated that this work during the year consisted principally in answering routine correspondence and inquiries. He referred to the difficulty of securing suitable articles for the *Bulletin* and urged a wider interest on the part of members in contributing to its columns. As a suggestion in this connection, he recommended compilation of data on the number of district heating companies actively engaged in business, together with other statistics of a similar character.

For the Executive Committee, Chairman O. W. Kastens mentioned, as an important development of the year, the plea presented by a number of manufacturers of appliances used in district heating work, for the association to do something on a national scale to increase and advance the industry of district heating. In compliance with this request, the Executive Committee appointed a committee of leaders of the association to discuss the matter with a similar committee appointed by the manufacturers. No announcement was made of the joint committees' plans, as they have not yet taken definite shape.

For members of the Nominating Committee, President Schultz announced the names of Roger DeWolf, chairman, J. H. Walker and George W. Martin.

Report of Operating Statistics Committee

The first of the standing committee reports which were presented, was that on Operating Statistics, J. C. Butler, chairman. This report, as in past years, contained tabulated and analyzed data and information, the result of a questionnaire mailed to the member heating companies, covering such items as customers, meters, boilers, boiler pressure, steam produced and steam sold, heating requirements and similar items. Comparative figures for 1924 and 1923 were included to show the changes. The largest number of customers of any one company was 2029, while the average per company was 287. Residential customers of the 37 companies reporting were 1455 and business customers, 9172. The data show that most of the steam sold is live steam, the comparative figures being (in thousand pounds) exhaust steam, 2,625,646, and live steam, 10,386,016. The cost of coal, it was shown, is going down, the average price last year being $4.18, as compared with $4.45 in 1924 and $5.24 in 1923.

Of the 29 companies reporting on their connected load (equivalent direct radiation) the total amount of all the companies was 22,171,000 sq. ft. The smallest company reported 82,000 sq. ft. and the largest, 4,325,000 sq. ft., the average being 764,000 sq. ft. In 1925, the average came to 660,000 sq. ft., and in 1923, the average was 685,000 sq. ft.

In the matter of heating requirements, the average pounds of steam per square foot of radiation per year was reported to be 500 lbs. as compared with 537 lbs. in 1904 and 498 lbs. in 1923. This would indicate that the efforts of the association in the direction of educating customers to conserve their steam are bearing fruit.

In connection with the length of the heating season, which was given as, on the average, 256 days, with an average temperature of 41.7° F., the suggestion was made that the heat-degree method, developed by the American Gas Association, be used in place of the present basis. This proposal was endorsed by Past President J. H. Walker. Mr. Butler stated that the committee had already determined to make this change.

The income per thousand pounds of steam averaged $0.826, as compared with $0.910 in 1924 and $0.867 in 1923.

The accompanying table was included as indicating more accurately the yearly variation in some of the items covered.

	1925	*1924*	*1923*
Total number of customers	2,603	2,540	2,573
Total steam sold—1,000 lbs	5,400,758	5,287,425	4,966,838
Av. steam per customer—1,000 lbs	2,070	2,080	1,930
Total tons of coal	384,034	418,188	396,655
Av. evap. (steam sold basis)	7.03	6.32	6.26
Av. cost of coal per ton	$4.31	$4.67	$5.33
Av. B.T.U. of coal	12,700	12,500	12,600
Av. B.T.U. for 1 cent	58,850	53,500	47,250
Av. income per 1,000 lbs. steam	$.914	$.916	$.913

"One reason why a smaller number of customers was reported is due to the fact," Mr. Butler stated, "that the buildings are considered as units."

Another report presented at this session was that of the Research Committee, Fred. B. Orr, chairman.

Report of Heating Research Committee

Easily the outstanding feature of the Heating Research Committee's report was the trend toward by-product heating systems and descriptions were given of typical by-product systems in Kansas City, Detroit, Pittsburgh and Rochester.

"We are in a new era to-day," declared the report, "and much thought is being expended in the advancement of central station heating. New theories are being tested, new methods being applied and the service is becoming a real economic factor.

"There is a general undercurrent of opinion to the effect that steam heating rates are too high to secure all classes of business, and methods within the industry should undergo revision in an endeavor to popularize the service by lowering production costs.

"Member companies should analyze their local conditions along the lines suggested in the report and determine each case strictly on its merits."

In connection with by-product heating systems, the committee's conclusions were:

"By-product heating systems, conservatively designed, offer attractive possibilities to lower prevailing rates for service or yielding greater net returns to the utilities.

"In general, this type of system is economically possible only by close relation with the local electrical utilities; and distinctly ill-advised for independent companies in competition with the electric companies. The generating equipment must be able to 'float' on the distribution network of a larger electric system for best results."

Finally, electric companies were urged to adopt a more liberal viewpoint and to aid the heating utilities in establishing themselves on a better basis.

After pointing out how the increase in charges for service by transportation in gas and heating utilities has been so much greater than those of electric companies, Mr. Orr stated that one of the evils of the situation is the stupendous waste in the use of steam, a considerable percentage of which is preventable through attention to the heating system and by educational methods. Buildings formerly equipped with isolated electric and exhaust heating plants have been using an excess amount of steam because the exhaust was available and would otherwise be vented to the atmosphere. Unfortunately, this class of customer now presents great resistance to the sale of street service and a low unit selling price for steam must be offered to secure the business.

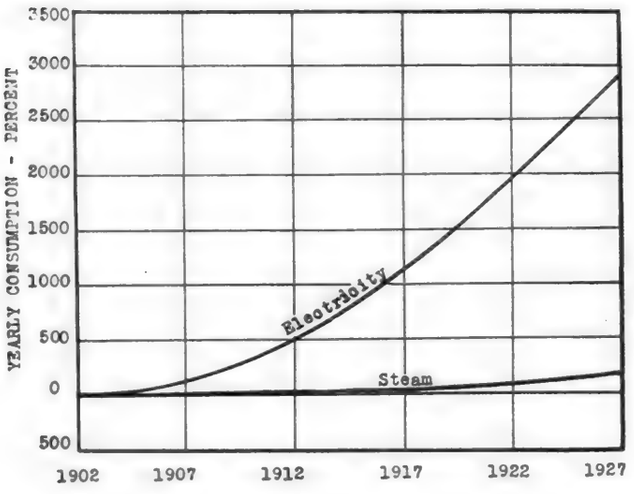
BY-PRODUCT SYSTEMS

So important did the matter of rates appear to the committee that the statement was made in the report: "If retrogression in the industry is to be prevented, the obvious procedure is to inquire whether or not steam service may be marketed at a lower figure through the adoption of new methods. There has been a revival of interest in the subject of by-product heating, which has been investigated by several of the leading companies and offers unexpected possibilities."

The report proceeded to present a theoretical statement of this subject, including the latest analyses of those companies which are pioneers in by-product plant operation. In this connection, Mr. Orr predicted that a steam pressure of 400 lbs. will shortly become standard practice.

CHARACTERISTICS OF HIGH BACK-PRESSURE TURBINES

Justification of the installation of by-product systems in Rochester, Pittsburgh, Detroit and other cities was ascribed in the report largely to improved economy or low water rates in back-pressure turbines. This advance



Comparative growth of electric and heating companies

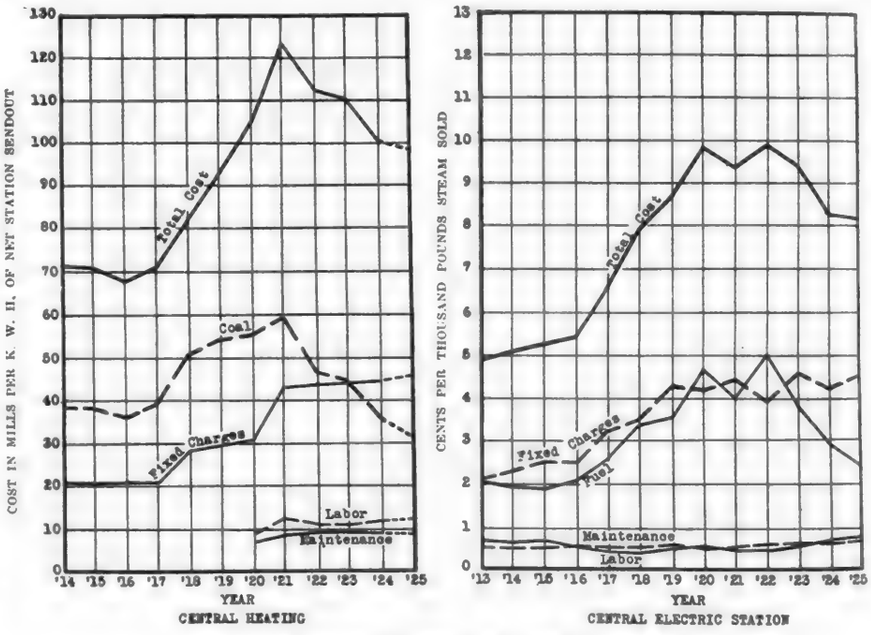
in the art, it was brought out, has been demanded by large industrial establishments requiring great quantities of process steam at pressures up to 100 lbs. per square inch, a back-pressure which is unthinkable for reciprocating units or old-type turbines. These efficient turbines are now available in large capacities, both exhaust and extraction type.

Data were presented in the report on the characteristics of high back-pressure turbo-alternator units covering a range of steam pressure from 350 lbs. gauge to 650 lbs. gauge and back pressure of 75 lbs. gauge to 150 lbs. gauge. The initial steam temperature in each case was taken as 700° F.

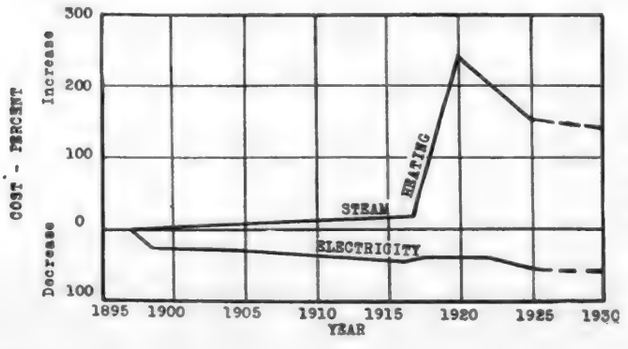
The report went extensively into the heat economy of a by-product heating plant versus central station power generation. It was shown that the total cost of generating electrical energy in a heating plant, including investment charge was approximately equal to the estimated income received from the electric company for secondary energy. Any profit, therefore, would have to be derived from the capacity or primary charge allowed. Arguments were presented to show the justice of making a liberal allowance by pointing out the real advantage derived by having such capacity tied in with the electric systems, supplanting equivalent units elsewhere. Failure of the electric utility to recognize this factor, it was pointed out, while it will not show a big profit for heating will, nevertheless, result in actual economy for the combined heating and electric utilities.

Descriptions of the by-product systems in Kansas City, Pittsburgh and Rochester, as well as that of the proposed exhaust heating system in Detroit, furnished impressive evidence of the strength of the position taken by the Research Committee on this subject.

In the discussion, Mr. DeWolf stated that, in his opinion, the industry will be forced into the electric and heating combined systems. The Rochester plant, he said, has borne out expectations.



Trend of Operating Costs and Fixed Charges



Progressive lowering of costs for electric service compared with rapid increase in cost of steam for heating

E. L. Wilder spoke of the decline in cost of coal, making competition with the isolated plant more acute. For this reason, the ability to supply a combined service is a great advantage.

President Schultz epitomized the situation by stating that the older plants sold steam as a by-product, whereas in the new plants, electricity is the by-product. F. B. Orr pointed out that it was necessary to sell the idea to the electric concerns, in order to bring down the cost of furnishing steam for district heating.

It was recommended that copies of the report be distributed to the electric utility concerns.

President Schultz appointed as members of the committee to confer with the manufacturers on the proposed promotion plan, L. G. Meyers, Pittsburgh, chairman, Charles H. Day, Detroit, Roger DeWolf, Rochester, N. Y., J. H. Walker, Detroit, and D. S. Boyden, Boston.

The session closed with a presentation of a set of pictures which had been received that morning from H. P. Margolis of the firm of Rud. Otto Meyer, Hamburg, Germany, showing some of the large district heating work which has been carried out by that concern in a number of German cities. Mr. Margolis, who recently visited a number of American cities to study district heating plant operation in this country, sent his greetings to the association and promised to furnish a paper dealing with district heating practice in Europe, especially with reference to by-product plant operation, which is the practice generally followed in Europe.

Evening Session, June 1

A novelty in the form of a symposium was staged at the Tuesday evening meeting, which brought out some of the

most important data of the meeting. The session was listed as "a symposium of recent developments in and future trend of central station heating." Many of the statements of the speakers were of a confidential nature and were not given out for publication. Among the speakers were William J. Baldwin, Jr., chief engineer of the commercial division of the New York Steam Corporation; J. H. Walker, superintendent of heating of the Detroit Edison Co., Detroit; Charles H. Day, of the Cleveland Electric Illuminating Co., Cleveland; T. E. Purcell, of the Allegheny County Steam Heating Co. of Pittsburgh; and R. D. DeWolf, of the Rochester Gas and Electric Corp., Rochester, N. Y. Mr. Baldwin's address is given in full on another page of this issue.

RECENT DEVELOPMENTS IN DISTRICT HEATING IN DETROIT

J. H. Walker told of the recent development in the steam heating service in Detroit, which he said was one of steady growth.

The art of metering the customer's service, he said, has become fairly satisfactory. Condensation meters only are used. The number of meter tests made necessary by customers' complaints had been reduced to a negligible quantity, although the number of meters found slow and stopped is still too high. Of the 1998 meters in service in 1925, 220 were found slow or stopped and all were found spinning.

In the matter of overall thermal efficiency, there has been steady progress. The best index of this efficiency is the yearly figure for the steam sold per pound of coal burned. For the past several years, this figure has been as follows:

1916	6.25	1921	6.15
1917	6.10	1922	6.55
1918	5.82	1923	6.64
1919	6.14	1924	6.75
1920	6.08	1925	7.09

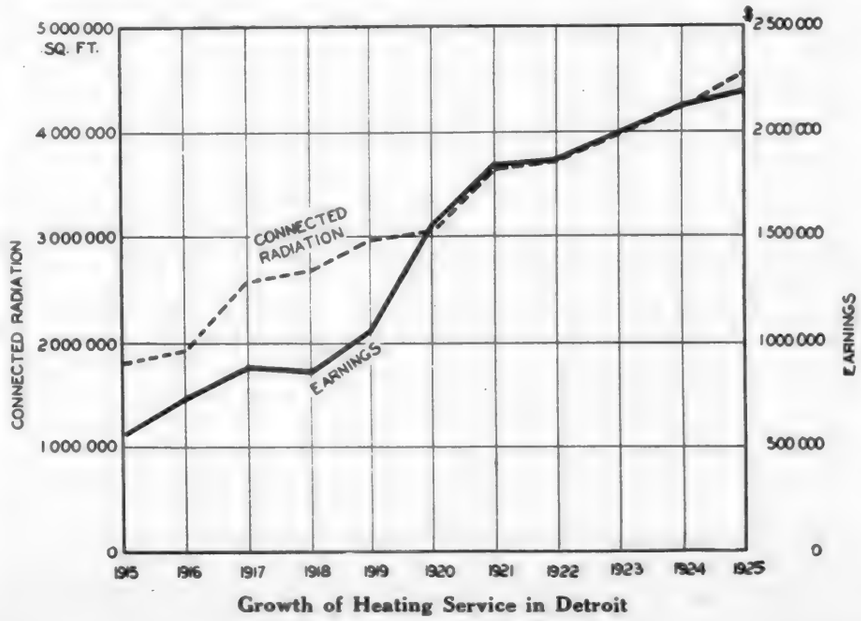
The improvement, said Mr. Walker, has been due to better boiler plant problems, higher accuracy of consumers' meters and the relative decrease in distribution loss as the quantity of steam handled has increased.

Mr. Walker had some interesting comments to make regarding the total overall efficiency in heat generation, transmission and utilization. With a boiler plant efficiency of 75%, which could be bettered were it economical to do so, the efficiency of the distribution system is about 81% and that of the consumers' system (some heat being rejected in the condensation) is about 92%. The overall efficiency of the complete cycle may thus be said to be about 56% which compares very well with other methods of heating buildings.

Construction planned for the present year includes (1) the first section of the Beacon Street heating plant; (2) a tunnel and feeder to transmit the steam from this plant to a distribution center, and (3) new distribution mains totaling about 4300 ft., this being the first major extension of the system in several years. The first section of the plant, which will be ready for service in the Fall, will contain two boiler units, each of 4150 H.P. rated capacity, stoker-fired and capable of being operated at from 250% to 300% rated capacity. There is room on the property for twelve boilers.

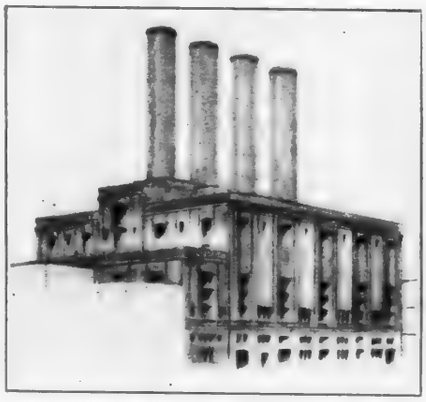
The tunnel which contains the feeder from the plant, is 1948 ft. long and has space for several feeders. It is of the usual type, built of brick with a concrete floor. The feeder now being installed is a 16-in. pipe.

The earnings, he said, with the present rate schedule and present operating costs are satisfactory. They are not quite sufficient to pay for the cost of capital were the heating business separately financed, but since it is operated as an auxiliary to an electric light and power business, the situation is at present acceptable.



Growth of Heating Service in Detroit

"As to the future," he said, "we are prepared for a continuance of the steady growth which we have experienced. We look to see the business district of Detroit increase greatly, both as to area covered and as to the size of buildings erected. Undoubtedly, the popularity of the service will continue and will increase. The strong but growing demand for it among building owners and operators is but typical of the constant trend toward greater convenience."



Design for Beacon Street Plant of Detroit Edison Company

Mr. Walker made the interesting statement that his company does not expect to attempt to cover the residential field. The requirements for residence heating de luxe, he said, are now satisfactorily taken care of by the oil burner and, in some cases, by the use of gas, and the scattered loading and constantly changing character of a residence district in a rapidly growing city make it an unfavorable field for district heating.

Recent Developments and Future Trend of Steam Heating From Central Stations in Cleveland

Heating buildings from a central heating plant, stated Mr. Day, has existed in Cleveland since 1906. At that time exhaust steam from the reciprocating engines at the Canal Road Station was piped to a few of the larger buildings of the down-town section. This steam was purely a by-product of electric generation.

During the next ten years the system gradually expanded until in 1916 it embraced roughly the central area of the city. During this period the East 70th Street electric generating station was started and the Canal Road Plant gradually changed to a heating plant with less and less electric generation, the large reciprocating engines being replaced with small back-pressure turbines. Today this station is considered as a heating plant, although a very small amount of electric power is still made at this point.

Steam lines from this station were originally designed and installed for low-pressure steam. This limits the pressure that can be supplied, and until

these lines are worn out or become obsolete, this situation will remain unchanged.

The relative growth of the service rendered from 1916 up-to-date and the amount of steam sold yearly was shown by curves.

In the first seven years of this ten year period, or up to 1922, the growth was fairly uniform and was made up of additions in the existing territory served. During this period the additional boiler capacity required was obtained principally by improvements of the existing equipment, some line extensions designed to balance the distribution system and other changes of a similar character. However, in 1922, the company found itself up to the limit of its boiler capacity, and during the next two years, or until 1924, very little increase took place.

During 1923 and 1924 the demands for heat from additional buildings, both within and without the area served became very great and finally resulted in the Cleveland Association of Building Owners and Managers asking the Illuminating Company to consider an extensive program for the future development of central heating.

As a result of the association's activity, the City Council passed an ordinance which extended the existing steam heating rates for a ten-year period, and this ordinance was accepted by the company. This action put the company in a position to make the investment required for the desired extension to its heating system.

On July 5, the date the new ordinance took effect, ground was broken for the new East 20th Street Heating Plant, and on January 1, 1925, slightly less than six months later, the first boiler was put into operation and steam turned into the lines. The plant has one boiler room large enough for six 1500 H.P. boilers, one stack and a small office building containing locker rooms, etc. Only three boilers, however, were installed.

These boilers are designed to burn powdered fuel; feed pumps are steam driven, exhausting into a feed-water heater, and all other equipment, such as conveyors, mills, etc., are motor-driven. Throughout the entire design of the plant the idea of simplicity was paramount. Nothing was included in the design that was not absolutely necessary, although space has been left so that economizers, coal dryers, etc., can be installed if conditions warrant such a step.

When the entire plant is completed there will be two boiler rooms sufficiently large for twelve boilers and four stacks. The twelve boilers will be capable of furnishing a maximum of approximately 50,000 H.P.

Steam is generated at this point at 150 lbs. pressure and all new lines installed in the vicinity of this plant are designed for high-pressures and to allow for large pressure drops.

Since the new heating plant has been built the area served has been increased somewhat. This district is just beginning to be built up and will eventually require considerable capacity.

As to the future, coming years are expected to bring a steady increase of load, due to the natural growth of the district served and to the extension of this district as the demand warrants. The new plant is well situated at the northeastern corner of the business district, and as this district is restricted on the north by the lake and on the west by the Cuyahoga River, the location of the plant is gradually becoming more and more central to the load that it will serve.

Speaking for Pittsburgh, W. W. Stevenson cited as an instance of the business activities in that city, the case of a block that was being wrecked to accommodate a new building of the skyscraper class. As a result of this kind of building activity, the large consumers have outgrown the older plant, which is now being superseded by a modern up-to-date heating plant, large enough for covering downtown Pittsburgh. In Pittsburgh, he said, they are particularly interested in by-product production and expect great things from it.

New Era for District Heating Business

R. D. DeWolf, of the Rochester Gas and Electric Corporation, declared: "The recent developments in the use of higher pressure boilers, higher-pressure turbines and higher-velocity steam lines mark, I believe, our entrance into a new era in the heating business. These factors all aid in bringing about a closer relationship between the heating business and the electric light and power business. Just as we have found interconnection between the electric companies and a close co-operation between the operating departments of the electric companies to be advantageous, so we will find that a close inter-relationship and co-operation between the heating and the electric business will be increasingly important.

"The use of higher pressure and higher temperature steam at the point of steam generation makes the use of this steam through turbines, as reducing valves, more attractive than heretofore. Central station companies are in a better position to make use of the advantages, arising from a combination of the heating business with the electric light and power business, than any other organization. They can make effective not only all the economies which an isolated plant accomplishes through the combination of heating with a power load, but in addition, can add to these advantages the peculiar economies resulting from the diversity of the central station load.

"The possibilities of development of the heating business in our larger cities are very great; the demand for low-pressure steam, coming at a time of year when the power demand on the electric system is likewise at its peak, permits of the generation of a very considerable bulk of power at that time through the use of higher-pressure boilers and turbines, exhausting into low-pressure heating systems. Such a plan makes available a considerable capacity in K. W. during the electric peak, and puts into the electric system a very considerable number of K.-W. hours, generated at a very high thermal efficiency made possible by the demand for heating steam.

"I believe the steam distribution system of the future will develop somewhat along the lines of our electric distribution systems, i.e.; a network of low-pressure distribution mains, delivering steam to the customer, together with high-pressure feeder mains, carrying high-pressure steam at high velocity, and delivering this steam to non-condensing turbines, located at proper points for delivering their exhaust steam into the low-pressure distribution system. These turbines will be operated without operators. They will be fully equipped with automatic devices to shut the turbine down in case of trouble on the machines and disconnect it from the electric system. The low-pressure steam would then be supplied through reducing valves, feeding directly into the low-pressure distribution system. The modern non-condensing turbine has been developed, so it is to-day not only a highly efficient machine, but very rugged and subject to a very few interruptions.

"The heating business has now passed into a field where it is a real service in the best sense of the word. The successful heating company of to-day does a great deal more for their customers than merely furnishing a substitute for the low pressure 'fog', formerly supplied by the customer's own boilers and delivered to their heating equipment in their buildings. Such a heating company carries a corps of engineers, specially trained in assisting their customers in effecting the economies made possible by the use of central station heating service. Much has been accomplished in the way of automatic regulation and in the general education of the users of this service. It is self-evident that to render a service of this character costs more than the mere operation of a boiler plant, and a growing appreciation of this fact has enabled the heating companies, for almost the first time, to build up a rate structure commensurate with the service being given, and such that the heating business is gradually reaching the point where it is able to stand squarely on its own feet.

A feature of this session was the presentation of moving pictures, many of them "shot" personally by President Schultz and showing conditions in Detroit, Cleveland, Pittsburgh and New York. Another set of moving pictures, constituting part of a film developed by

the Allegheny County Steam Heating Company in Pittsburgh, showed a number of installation schemes and were intended to indicate the possibilities of working up a film that could be shown before the general public and would constitute a liberal education on the subject of district heating.

As the session closed, it was announced that the manufacturers' committee, to discuss the subject of district heating promotion with the committee of the association, was composed of H. W. Coombs, E. B. Badger & Son Co., Boston; C. Gottwald, Ric-wiL Co., Cleveland; A. M. Moulder, Grinnell Co., Warren, O.; F. R. Slade, American District Steam Co., North Tonawanda, N. Y.; and J. C. Redfield, Central Station Steam Co., Detroit.

Morning Session, June 2

Under "Station Operating," the report of the Station Operating Committee, presented by R. G. Felger, chairman, dealt with practically all methods of firing, with the exception of stokers. The use of stokers had been well covered in previous reports of this committee. One of the timely topics discussed in the report was the use of air preheaters and their effect on boiler room economy. This subject was presented by W. A. Herr, of Philadelphia. Another section on the use of fuel oil by a central station heating system was presented by D. Caleb, of Kansas City, Mo. Mr. Caleb stated that at the present rate of consumption of fuel oil, the available supply was rapidly being used up. He felt that in the course of time, the supply will be greatly restricted. In the meantime, however, the use of oil, he expects, will prove a very severe competitor of the central station heating plant.

Other subjects discussed in the report of the Station Operating Committee were "The Fin-Tube Furnace" by Thomas D. Murray, a description of the fuel-burning equipment of the Cecil plant of the Allegheny County Steam Heating Company by F. A. Guenther, of Pittsburgh, the use of cold water versus steam for removing slag from the tubes of a spring steel boiler, by F. T. Wilson, Chicago; use of air blast over the fuel bed in the operation of Coxe forced-draft chain grate stokers, by F. T. Wilson; ash removal from the Edison Building, Chicago, by F. T. Wilson; and reducing valves, by F. A. Guenther.

NEW OFFICERS

At this point, the chairman called for the report of the Nominating Committee, whose ticket was unanimously elected as follows:

President, J. E. Seiter, Detroit Edison Co., Detroit, Mich.

First vice-president, Charles Gillham, New York Steam Corporation, New York.

Second vice-president, Charles H. Day, Cleveland Electric Illuminating Company, Cleveland, O.

Third vice-president, J. W. Meyer, Philadelphia Electric Company, Philadelphia.

Secretary-treasurer, D. L. Gaskill, Greenville, O.

Members of Executive Committee: W. W. Stevenson, Pittsburgh, Pa., and Landis S. Smith, Rochester, N Y.

Report of Rates and Regulations Committee

The report of the Rates and Regulations Committee presented by John W. Meyer, chairman, was devoted entirely to an attempt on the part of the committee to work out all the factors which must be taken into consideration in developing an equitable rate. Each factor was considered in detail and the results were presented in tentative form and were not given out for publication. The presentation constituted an impressive exhibit of the problem involved in analyzing loads and in fixing upon a fair schedule of rates.

Morning Session, June 3

For the Hot Water Committee, R. C. March, chairman, said that the work in which the committee is engaged is a phase of that much discussed problem "Flow of Water in Pipes" as applied to the distribution of hot water circulation on the basis of quality circulated per square foot of radiation. The committee had no detailed report to make this year as the data in hand are not sufficient to warrant conclusions.

Report of the Heat Utilization Committee

As usual, one of the feature reports of the meeting was that of the Heat Utilization Committee, presented by J. E. Seiter, chairman. The work of the committee was embodied in the booklet on "Principles and Methods of Heat Utilization" which is being put out for distribution by the member heating companies to building owners and managers and others. As Mr. Seiter stated, the booklet contains much information which has been presented by the committee during the past years. This material has been rewritten in cooperation with the Research Committee of the National Association of Building Owners and Managers.

"It was felt," stated the report, "that it was too early to set forth the feelings of the association in the controversial discussion on ventilation."

As the booklet is intended primarily for the information and use of building owners and managers who are operating buildings with heating systems connected to district steam systems, most of the recommendations it contains cover this particular field of heating.

"It is the purpose of the committee," stated Mr. Seiter, "to arrange meetings of building owners and managers throughout the country, which will be addressed by representatives of the heating companies. At these meetings, the booklet will furnish the texts for the discussions and will be explained to those in attendance."

The second part of the Heat Utilization Committee's report was devoted to "Customers' Relations" or "Service Follow-up." A procedure followed by some of the larger heating companies was outlined, the importance of personal contact with the customer was emphasized. In many cases, it was stated, departments had been formed to compile information to be available to the customer upon request. This procedure, however, without the personal contact is apt to have many of the drawbacks of the old system, in that the customer was left mainly to his own devices and was assisted only when his troubles became aggravated enough to compel him to ask for help.

Some of the larger, more active and successful heating companies have now adopted a form of service follow-up, whereby friendly relations are cultivated with the customer and an intimate contact is maintained through frequent periodic inspections and conferences, both during the time the building is being connected to the system and after steam has been in use for a period of years. In this connection, the report advocated that meters be read twice a week. In the larger companies, a complete separate department, known as the commercial department, educational department, service department or industrial sales department, takes the place of the individual.

Among the desirable features of several of the successful service systems now in use, the report mentioned the following:

The company's representative who is to be in charge of the particular heating job throughout its connection to the company's system acquaints the customer with the service offered by the company. This is done before or at least immediately after receiving the contract so that the particular points which directly affect the customer's job may be kept in mind. In case of a new job considerable assistance may be given in selecting and designing the heating system after a letter or personal call establishes contact with the architect or engineer. The company's standard connection diagrams are furnished, the rules and regulations of the company are presented and explained, and any special information which is desired is obtained. This is, of course, an excellent time for the effective use of the committee's new booklet.

After the customer is using steam a monthly check of the actual steam consumption vs. the estimated consumption is made. It will be found advisable, in some cases, to make more frequent checks and to go into refinements, such as pounds per degree-day, etc. The customer should be encouraged to keep track of and assist in making these studies. If these checks indicate that the customer is using a good deal too much or too little steam an immediate

investigation is made to determine the cause. In case of low readings the cause is usually found in some stoppage in the piping or in the meter, or in changed conditions of occupancy, although in rare cases the customer may be found to be appropriating steam.

In cases where the readings are too high it is usually a more difficult proposition to discover the cause, and also much more difficult to remedy it after it has been found. However, the use of recording thermometers judiciously placed about the premises to record the building temperature, a recording pressure gauge on the customer's system, a recording thermometer on the condensation, separate meters for water heaters, daily or hourly readings and other expedients are usually effective in finding the difficulty. The job of remedying the situation then begins and the means recommended by the company representative will, of course, depend upon his study of each individual case. He should be assisted and supported in this work by the various departments of his company. Here again the committee booklet will be found of value in backing up recommendations made to the customer.

Where the readings proved to be in line with the estimate, many companies are still following the policy of staying away from the customer. However, several companies have learned that the best way to keep well-satisfied customers is to help the customer in all possible ways and thus prevent the origin of trouble. Once the customer's confidence and respect have been gained, the company representatives can find many ways of being of assistance. By keeping in closer touch with the customer through regular periodic inspection, picking out the weak spot in the existing system and its operation and applying the latter-day development of the business, the company representative has the opportunity of developing and maintaining a real friendship between the customer and the company. This friendship will assist in keeping the customer pleased with the service and will encourage him to become a booster for it and to recommend it to his friends.

Where the number of customers is large, it may be found advantageous to assign certain men to follow up certain parts of the work, thus avoiding confusion and repetition. Card systems, form letters and forms will assist greatly in systematizing the details of the work. Through long experience, it has been determined that only one man representing the company should deal directly with the customer. This company representative should be assisted in every way possible by the members of his own department and other company departments in carrying out his manifold duty connected with "Pleasing the customer—all of the time."

In the discussion of the report, William J. Baldwin, Jr., gave some interesting sidelights on the operation of the New York Steam Corporation's system. Meter readings, he said, are watched every week, and a plus or minus of 10% is taken as requiring further investigation. Of the company's customers, 80% are on steam flow meters. A study of the meter records, he said, is an essential part of the service. Most of the trouble the company encounters is with residence customers and small commercial buildings, which have no engineer.

"In New York," said Mr. Baldwin, "four hundred Pendleton controls are in operation, of which 95% show a considerable saving in the steam used. The savings run from 10% to 30% over those obtained with hand control."

In the Manufacturers Round Table, which closed the session, the Dry-Sys electrothermostatic control equipment, recently placed on the market by Drying Systems, Inc., Chicago, was described by Mr. Fabrice.

W. E. Worth told of a method used for saving steam by placing the thermostat directly over the radiator and having it operate to turn on the steam intermittently.

Another device presented at this time was a new Mason reducing valve, developed by the Mason Regulator Company of Boston.

J. A. Donnelly, of Donnelly Systems, Inc., New York, presented a general discussion on the subject of rating heating systems and he described the functioning of the Donnelly metering valve. Before the session adjourned, a proposed amendment to the constitution was presented, making it possible to choose more than one officer from a given State. This amendment was adopted.

Morning Session, June 4

One of the high spots of the convention was reached in the presentation of the report of the Distribution Committee by W. W. Stevenson, chairman.

Report of Distribution Committee

Part of the report dealt with fundamental points to be considered in the design of steam distribution systems. This took in the items of general plan and survey, transmission-line pressure and load factor, high-pressure feeders, initial-pressure variation and types of underground construction. Part 2 was devoted to steam distribution progress of some representative companies, such as the Milwaukee Railway & Light Company, the Central Illinois Light Company of Peoria, the Illinois Maintenance Company of Chicago, the Ohio Edison Company of Springfield, the Northwestern Electric Company of Portland, Ore., the Rochester Gas and Electric Corporation of Rochester, N. Y., the Union Electric Light and Power Company of St. Louis, Mo., the Kansas City Power and Light Company of Kansas City, Mo., the Allegheny County Steam Heating Company of Pittsburgh and the New York Steam Corporation of New York. Mr. Stevenson considered a typical section of a city to be heated from a single source and presented three different schemes for a piping layout, accompanied by an extended discussion of each scheme, from the standpoint of unit cost of the distribution system, piping design, annual and first cost of a two-pressure distribution system, typical load duration term, economical plant pressure, as derived from various proportions of by-product energy utilization, comparative cost of high and low-pressure steam transmission, typical maximum and minimum monthly loads and initial pressure corresponding to these loads.

In the discussion of this report, Mr. Orr stated:

"The difference between the isolated plant and the central plant, the higher the efficiency obtainable in distribution, or, in other words, the more nearly negligible its effect on total costs of a utility, the easier it will be to furnish central service in competition with the isolated plant.

"Future types of construction should be planned with the thought of decreasing as much as possible the investment and maintenance costs. There should and probably will be developed a type of conduit which will combine mechanical protection and insulation of the mains. Such a conduit could greatly reduce labor costs for installation. There may be devised some method of applying such combined conduit and insulation on the pipe lengths in a shop or yard, and installing pipe, conduit, and insulation as a unit. Such a scheme should be particularly feasible in view of the increasing trend toward welded joints, as this complete assembly of pipe, conduit, and insulation could be made up outside of the trench in lengths convenient for handling, leaving only comparatively few joints to be finished in the trench.

"Recent advancement in the art of welding pipe lines will undoubtedly prove a valuable factor in reduction of costs.

"Inasmuch as steam mains seldom wear out from use but are very often corroded by external agencies, if more efficient conduit and insulation are devised, there may be an appreciable saving in cost by the use of lighter-weight pipe and fittings, especially for low-pressure work.

"There is a demand for reliable information on the economical thickness of underground steam-pipe insulation in the same manner as has been worked out for exposed insulation, and it is to be hoped that this will be undertaken in the near future.

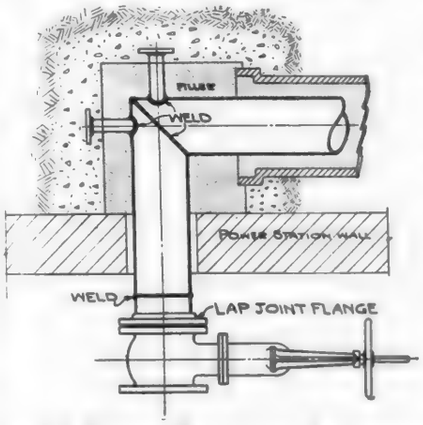
"It is in keeping with the best engineering practice along other lines to keep all losses to a minimum by improved line construction.

"A number of central heating companies have gotten into serious and expensive difficulties because their system was designed without proper provision for future expansion, and in order to

serve new business it has become necessary to replace existing mains with larger ones or to install additional mains, which necessity has greatly increased their capital investment. Therefore, a careful survey should be made, showing the requirements of the system for the first year of its operation and for various succeeding years, as nearly as they can be determined, up to twenty-five or thirty years from its beginning. This period of time is considered because it is reasonable to expect that underground mains should last at least this long.

"The proper plan is to design the system for ultimate conditions in such a manner that it may be installed piecemeal and give satisfactory service in the various stages of its development.

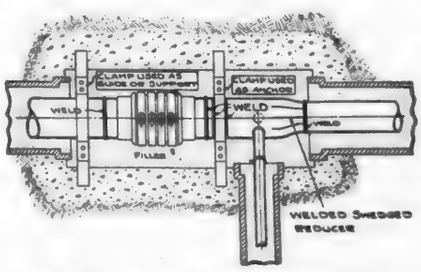
"In laying out a steam-distribution system, it is good practice, insofar as possible, to have the mains so interconnected as to provide duplicate methods of supply to at least the major sections of the system, so that the amount of main to be shut off for a maintenance job of any sort will be a minimum.



Use of Welding Process for Supporting and Anchoring Underground Steam Pipe Made Up Only of Piping and Ordinary Flanges

"Recent tendencies in the distribution of steam have been along the lines of higher initial pressure and the necessarily heavier construction thereby required. However, the result has been an overall saving in transmission costs, even with the low load factors encountered in the heating industry.

"The pressure to be used on a steam-distribution system will be determined largely by the purposes for which the steam is to be used. In general, however, the system should be designed from the allowable pressure drop, as the capacity of a steam main is more nearly a function of the pressure drop than of the pressure. With this in mind, then, the system should be designed for two extremes of pressures: first, the minimum pressure allowable at any point; and, second, the maximum pressure allowable. The minimum pressure is governed by the purpose for which steam is to be used in the buildings served, and the maximum pressure is limited only by the strength of mains, fittings, and other equipment.



Use of Ordinary Steam Clamps as Support Guides or Anchors

"For any particular system the economical range of pressures may be determined by a study of costs with equipment designed to carry various pressures. For the average heating system it is good practice to use standard-strength equipment and base the sizes of mains on a nominal pressure of about 20% to 30% of that allowable for such equipment. This practice allows the operator in the future to take advantage of the increase in capacity possible by raising the initial pressure and creating a greater pressure drop through the system."

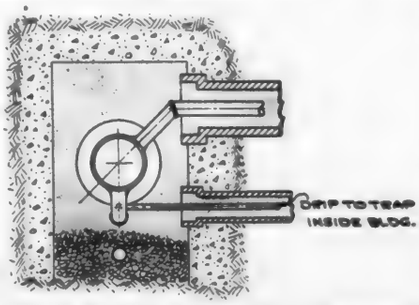
President Schultz suggested large plants for base loads and basement plants to take care of peak loads. The discussion turned on the idea of using block plants in place of central heating plants. The investment item, it was pointed out, is a vital factor in the problem.

Welded Pipe in District Heating Work

The concluding paper of the meeting was presented by A. W. Moulder, chief engineer of the Grinnell Co., on "The Advantages of Welded Pipe in District Heating Work." "Autogenous welding of piping," said Mr. Moulder, "has distinct advantages in both station work and underground distribution lines of district heating companies."

For the Corrosion Committee, J. H. Walker, chairman, said the committee had no report to make, but would recommend to the members the new book on corrosion by F. N. Speller, which has just been issued.

President Schultz summed up the work of the meeting in the statement that it had considered the commercial, as well as the technical, aspects of the district heating industry. He felt that the association was to become much more than a technical body. In the future, it will go into such problems as the financial and commercial side of the business, and he advocated the extension of the membership to include commercial members.



Welded Service Connection and Welded Drip Pocket Connection

The new president, J. E. Seiter, was escorted to the rostrum by F. B. Orr and was enthusiastically greeted by the members. In a brief but happy address, he gave enthusiastic praise to the administration just closing and bespoke the loyalty of the members in making the next year as successful, if not more so. The meeting then adjourned.

The Entertainment

Between the attractions connected with Niagara Falls and the program laid out by the American District Steam Company for the entertainment of the members and guests at the seventeenth annual convention of the National District Heating Association in Niagara Falls, June 1-4, a round of entertainment was provided which proved most delightful.

Care was taken to schedule morning technical sessions only, with the exception of the Tuesday evening session, so that all of the afternoons and most of the evenings were available for sightseeing and other events. On the first evening of the meeting, there was a reception and bridge party for the ladies.

The following afternoon, Wednesday, the entire convention party were the guests of the American District Steam Company on a trip through the Lower River Gorge, with stops at the Whirlpool for those who dared to take the trip on the Spanish Aerial Railway over this point, and with a stop at the Terminal Hotel for tea and refreshments. Another trip, arranged by the American District Steam Company, was an automobile ride along the upper Niagara River with a short visit to the company's plant in North Tonawanda.

Wednesday evening was devoted to a dinner dance at the Clifton Hotel in Canada. This proved a very attractive party, and judging from the nature of the music furnished by the hotel's orchestra, it was evident that Americans have nothing on our Canadian cousins in the way of up-to-date jazz melodies.

The association's golf tournament was held Thursday afternoon at the Niagara Falls Country Club in Lewiston Heights on the American side. This proved a most delightful outing, in spite of the fact that a high cold wind blew throughout the afternoon.

THE ASSOCIATION'S BANQUET

Thursday evening was devoted to the annual banquet of the association at the Niagara Falls Hotel. President Alexander Dow of the Detroit Edison Company and President R. M. Searle, of the Rochester Gas and Electric Corporation, were the honor guests and each made a notable address at the conclusion of the dinner. Secretary D. L. Gaskill acted as toastmaster.

Mr. Dow spoke first of the happy frame of mind in which he found himself, due to the fact that he had just received word of the successful outcome of his negotiations for a $15,000,000.00 loan for the purpose of financing the extension of the Detroit Edison Company's heating system. He spoke of the importance of maintaining a ratio of four to one in relation to capital and income, that is, that the income should reach at least one-fourth of the capital before further extensions should be considered. He thought the prospects of lower basic costs were not as bright as they might be.

In speaking of the extension plans sometimes placed before him, he pointed out that the most effective way of getting them through was to show a profit under the present operation, rather than an argument based upon red figures. Expressing it epigrammatically, he said: "It is better to climb up on your own side than to have someone reach over and pull you up."

Mr. Dow spoke glowingly of the future of the district heating industry. "There is no limit," he said, "to the service you can give."

Mr. Dow had some interesting things to say regarding the progress of the gas industry and how it is likely to prove a factor in the district heating field. "It will not be long," he said, "before we will not be burning coal direct, but will be treating it in a pulverizer and be burning gas." He said central station heating men were investigating the gas possibilities with the idea of using gas heating for scattered loads and the present central station methods for the centralized loads. This would affect materially the character of the heating load.

At the same time, it would be a departure from present gas practice. "The gas men," said Mr. Dow, "have got to modernize their methods." He looked to see the gas heating industry tied in with the electric lighting industry.

Small towns, he said, provide a good field for what he described as one-man plants, in which the gas and steam heating idea was combined.

R. M. Searle stated that in Rochester, the requirements to meet the extensions of the next seven years would come to over $6,000,000. He made the interesting statement that some of the extension work being carried on in Rochester is in districts which are not yet built upon, in anticipation of its being an industrial center in the future. As isolated plants in buildings become inadequate, they offer good opportunity for connection to the district heating line.

He felt that industry in America is on the threshold of a new forward movement. Wages and therefore, costs, he said, would not come down, and he expressed the sentiment "God forbid that they should."

The present age, he said, was an age of comfort and luxury and he felt that these should be the inducements of convenience and service presented by the central station heating man, rather than any possible economy.

The evening's program was concluded with the presentation of a past president's medal to Mr. Schultz.

After the close of the convention on Friday, the new officers met to discuss plans for the appointment of members of the standing committees, in accordance with the new president's expressed wish that committees should be organized at the earliest possible moment, so that they could get a start on next year's work.

Convention Notes

A manual distributed by the New York Steam Corporation was devoted to "Distribution of Steam Service in New York City." Among the interesting facts mentioned in the manual is that there are nearly 2000 consumers on the company's lines, who are furnished approximately 5,000,000,000 lbs. of steam per annum, or an average of 2,500,000 lbs. per annum per customer. The smallest consumer uses less than 10,000 lbs. of steam per month, 70 lbs. during a heating season, or 120,00 lbs. during a twelve-month period, while the largest consumer requires in excess of 150,000,000 lbs. per annum. The equivalent of some 800,000,000 cu. ft. of building space is served, or on an average rate approximating 6 lbs. of steam per cubic foot per annum. This is equivalent, substantially, to 75,000,000 sq. ft. of floor area served. Among the illustrations is a typical layout of steam mains for an average city block. Details of standard 16-in. construction, standard manholes, and a typical installation of the Pendleton steam service control, with a suggested schedule for its operation. Size 8½ x 11½. Pp. 32.

American District Steam Company accompanied a booklet of tickets to various events connected with its outing with the sentiment that "We hope that these coupons will help to make this convention an enjoyable one." A folder accompanying the coupons was devoted to the new Adsco expansion joint and to other Adsco products, such as meter manifolds, long-expansion air valves, Adsco rotary meters, a new line of Adsco gate valves, Red Diamond brand casing, alignment guides, the Adsco system of atmospheric steam heating, the Simplex condensation meter and the Perfection reducing valve. A handsome souvenir of the occasion was distributed by the company in the form of a limp leather-covered booklet entitled "A Little Journey To a Great Scenic Attraction," devoted to Niagara Falls and conceived and printed especially for the American District Steam Company by The Roycrofters.

A handsome card case, done in brown leather, was distributed by E. B. Badger & Sons Co., Boston, Mass., as a reminder of the company's line of Badger expansion joints.

An interesting manual entitled "A Procedure Control for the Fabrication of Oxwelded Pipefitting" was handed out to the delegates by the Linde Air Products Co., New York. The booklet dealt with the selection and inspection of material, the design and layout of welded joints, the preparation of material for welding, welding technique and inspection and tests.

Those in attendance were:

S. F. Delaney, Atlantic City Elec. Co., Atlantic City, N. J.
D. L. Gaskill, Greenville, O.
Ralph L. Seger, Detroit Edison Co., Detroit, Mich.
Earle Shultz, Illinois Maintenance Co., Chicago, Ill.
W. A. Perkins, Western United Gas & Elec. Co., Aurora, Ill.
W. A. Perkins, Jr., Aurora, Ill.
William A. Marr, Philadelphia Electric Co., Philadelphia, Pa.
E. L. Reed, Atlantic City Electric Co., Atlantic City, N. J.
H. S. Bush, Arkansas Central Power Co., Little Rock, Ark.
C. B. Holliday, Central Illinois Power & Lt. Co., Peoria, Ill.
John T. Wurster, Iowa Rwy. & Lt. Co., Cedar Rapids, Iowa.
Randall J. Bodin, Detroit Edison Co., Detroit, Mich.
Davis S. Boyden, Edison Elec. Ill. Co., Boston, Mass.
John B. Dempsey, Detroit Edison Co., Detroit, Mich.
John W. Meyer, Philadelphia Elec. Co., Philadelphia, Pa.
J. H. Walker, Detroit Edison Co., Detroit, Mich.
G. D. Winans, Detroit Edison Co., Detroit, Mich.
W. W. Stevenson, Allegheny County Steam Htg. Co., Pittsburgh, Pa.
M. A. Barbon, Detroit Edison Co., Detroit, Mich.
L. C. Killen, Dayton Power & Light Co., Dayton, Ohio.
Claud R. Erickson, Board of Water & Elec. Lt. Comm., Lansing, Mich.
A. L. Ellison, Indiana General Service Co., Muncie, Ind.
William Baldwin, Jr., New York Steam Corp., New York, N. Y.
J. Treat, Pittsfield Elec. Co., Pittsfield, Mass.
David Caleb, Kansas City Power & Light Co., Kansas City, Mo.
Ernest E. Dubry, Detroit Edison Co., Detroit, Mich.
H. M. Brown, Detroit Edison Co., Detroit, Mich.
O. W. Kastens, Consumers Power Co., Grand Rapids, Mich.
F. P. Wilson, Illinois Maintenance Co., Chicago, Ill.
J. C. Butler, Illinois Maintenance Co., Chicago, Ill.
E. A. Lueky, The Detroit Edison Co., Detroit, Mich.
George W. Wright, Terminal Freezing & Heating Co., Baltimore, Md.
R. D. DeWolf, Rochester Gas & Elec. Co., Rochester, N. Y.
H. R. Wetherell, 1500 Peoria Life Bldg., Peoria, Ill.
James A. Donnelly, Donnelly Systems Co., New York, N. Y.
J. M. Arthur, Jr., K. C. Prolt Co., Kansas City, Mo.
Jesse E. White, Indianapolis Light & Heat Co., Indianapolis, Ind.
J. G. Hauser, Illinois Power & Light Corp., Bloomington, Ill.
John L. McCullough, Allegheny Co. Steam Htg. Co., Pittsburgh, Pa.
F. A. Gunther, Allegheny Co. Steam Htg. Co., Pittsburgh, Pa.
John E. Morrissey, Public Service Co. of No. Ill., Evanston, Ill.
G. H. Kelsey, Cleveland Elec. Ill. Co., Cleveland, Ohio.
Walter W. Boyle, Allegheny Co. Steam Htg. Co., Pittsburgh, Pa.
George F. Davis, Northern States Power Co., St. Paul, Minn.
Ralph C. March, Public Service Co. of No. Ill., Oak Park, Ill.
H. B. Stuck, Ohio Power Co., Lima, Ohio.

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

HEATING AND PIPING CONTRACTORS

STANDARD RADIATION ESTI

SHOWING RADIATION REQUIRED FOR C

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3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc. Fu	
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"	12"
	1.1	1.3	0.45	0.9	1.8	3.6	42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	60	.48	41	50	4
225	60.5	71.5	25.0	50.0	100	200	23.1	17.6	14.3	20.9	16.0	13.8	14.9	12.7	11.6	16.5	14.3	12.1	33.0	26.4	22.0	27.5	22
1	3.72	3.15	9.0	4.5	2.25	1.125	9.7	12.8	15.7	10.8	14.1	16.3	15.1	17.7	19.4	13.6	15.7	18.6	6.8	8.5	10.0	8.2	10
2	7.44	6.30	18.0	9.0	4.50	2.25	19.4	25.6	31.4	21.6	28.2	32.6	30.2	35.4	38.8	27.2	31.4	37.2	13.6	17.0	20.0	16.4	20
3	11.2	9.45	27.0	13.5	6.75	3.38	29.1	38.4	47.1	32.4	42.3	48.9	45.3	53.1	58.2	40.8	47.1	55.8	20.4	25.5	30.0	24.6	30
4	14.9	12.6	36.0	18.0	9.00	4.50	38.8	51.2	62.8	43.2	56.4	65.2	60.4	70.8	77.6	54.4	62.8	74.4	27.2	34.0	40.0	32.8	40
5	18.6	15.8	45.0	22.5	11.3	5.63	48.5	64.0	78.5	54.0	70.5	81.5	75.5	88.5	97.0	68.0	78.5	93.0	34.0	42.5	50.0	41.0	51
6	22.3	18.9	54.0	27.0	13.5	6.75	58.2	76.8	94.2	64.8	84.6	97.8	90.6	106	116	81.6	94.2	112	40.8	51.0	60.0	49.2	61
7	26.0	22.1	63.0	31.5	15.8	7.88	67.9	89.6	110	75.6	98.7	114	106	124	136	95.2	110	130	47.6	59.5	70.0	57.4	71
8	29.8	25.2	72.0	36.0	18.0	9.00	77.6	102	126	86.4	113	130	121	142	155	109	126	149	54.4	68.0	80.0	65.6	81
9	33.5	28.3	81.0	40.5	20.2	10.1	87.3	115	141	97.2	127	147	136	159	175	122	141	167	61.2	76.5	90.0	73.8	91
10	37.2	31.5	90.0	45.0	22.5	11.3	97.0	128	157	108	141	163	151	177	194	136	157	186	68.0	85.0	100	82.0	1
11	40.9	34.7	99.0	49.5	24.8	12.4	107	141	173	119	155	179	166	195	213	150	173	205	74.8	93.5	110	90.2	1
12	44.6	37.9	108	54.0	27.0	13.5	116	154	188	130	169	196	181	212	233	163	188	223	81.6	102	120	98.4	1
13	48.4	41.0	117	58.5	29.2	14.6	126	166	204	140	183	212	196	230	252	177	204	242	88.4	111	130	107	1
14	52.1	44.1	126	63.0	31.5	15.8	136	179	220	151	197	228	211	248	272	190	220	260	95.2	119	140	115	1
15	55.8	47.2	135	67.5	33.7	16.9	146	192	236	162	212	245	227	266	291	204	236	279	102	128	150	123	1
16	59.5	50.4	144	72.0	36.0	18.0	155	205	251	173	226	261	242	283	310	218	251	298	109	136	160	131	1
17	63.2	53.5	153	76.5	38.2	19.1	165	218	267	184	240	277	257	301	330	231	267	316	116	145	170	139	1
18	67.0	56.7	162	81.0	40.5	20.3	175	230	283	194	254	293	272	319	349	245	283	335	122	153	180	148	1
19	70.7	59.9	171	85.5	42.8	21.4	184	243	298	205	268	310	287	336	369	258	298	353	129	162	190	156	1
20	74.4	63.0	180	90.0	45.0	22.5	194	256	314	216	282	326	302	354	388	272	314	372	136	170	200	164	2
21	78.1	66.1	189	94.5	47.2	23.6	204	269	330	227	296	342	317	372	407	286	330	391	143	179	210	172	2
22	81.8	69.3	198	99.0	49.5	24.8	213	282	345	238	310	359	332	389	427	299	345	409	150	187	220	180	2
23	85.6	72.4	207	104	51.8	25.9	223	294	361	248	324	375	347	407	446	313	361	428	156	196	230	189	2
24	89.3	75.7	216	108	54.0	27.0	233	307	377	259	338	391	362	425	466	326	377	446	163	204	240	197	2
25	93.0	78.8	225	113	56.2	28.1	243	320	393	270	353	408	378	443	485	340	393	465	170	213	250	205	2

For Methods of Using Table See Back of Sheet.

INFILTRATION

Stationary Wood Sash	25	French Doors	100
Double Hung Wood Sash	50	Outside Doors	200
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fenestra	100	Inner Vestibule Doors	100

Metal Weather Strip Deducts 50%

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3 Col 38" St'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc. F	
			25	50	100	200	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"	1
	1.1	1.3	0.45	0.9	1.8	3.6	.42	.32	.26	.38	.29	.25	.27	.23	.21	.30	.26	.22	60	.48	.41	.50	
225	44.0	52.0	18.0	36.0	72.0	1.44	16.8	12.8	10.4	15.2	11.6	10.0	10.8	9.20	8.40	12.0	10.4	8.80	24.0	19.2	16.4	20.0	
1	5.11	4.33	12.5	6.25	3.13	1.56	13.4	17.6	21.6	14.8	19.4	22.5	20.9	24.5	26.8	18.8	21.6	25.6	9.38	11.7	13.7	11.3	1
2	10.2	8.66	25.0	12.5	6.26	3.12	26.8	35.2	43.2	29.6	38.8	45.0	41.8	49.0	53.6	37.6	43.2	51.2	18.8	23.4	27.4	22.6	2
3	15.3	13.0	37.5	18.8	9.39	4.68	40.2	52.8	64.8	44.4	58.2	67.5	62.7	73.5	80.4	56.4	64.8	76.8	28.1	35.1	41.1	33.9	4
4	20.4	17.3	50.0	25.0	12.5	6.24	53.6	70.4	86.4	59.2	77.6	90.0	83.6	98.0	107	75.2	86.4	102	37.5	46.8	54.8	45.2	5
5	25.6	21.7	62.5	31.3	15.7	7.80	67.0	88.0	108	74.0	97.0	113	105	123	134	94.0	108	128	46.9	58.5	68.5	56.5	7
6	30.7	26.0	75.0	37.5	18.8	9.36	80.4	106	130	88.8	116	135	125	147	161	113	130	154	56.3	70.2	82.2	67.8	8
7	35.8	30.3	87.5	43.8	21.9	10.9	93.8	123	151	104	136	158	146	172	188	132	151	179	65.7	81.9	95.9	79.1	9
8	40.9	34.6	100	50.0	25.0	12.5	107	141	173	118	155	180	167	196	214	150	173	205	75.0	93.6	110	90.4	
9	46.0	39.0	113	56.3	28.2	14.0	121	158	194	133	175	203	188	221	241	169	194	230	84.4	105	123	102	
10	51.1	43.3	125	62.5	31.3	15.6	134	176	216	148	194	225	209	245	268	188	216	256	93.8	117	137	113	
11	56.2	47.6	138	68.8	34.4	17.2	147	194	238	163	213	248	230	270	295	207	238	282	103	129	151	124	
12	61.3	52.0	150	75.0	37.6	18.7	161	211	259	178	233	270	251	294	322	226	259	307	113	140	164	136	
13	66.4	56.3	163	81.3	40.7	20.3	174	229	281	192	252	293	272	319	348	244	281	333	122	152	178	147	
14	71.5	60.6	175	87.5	43.8	21.8	188	246	302	207	271	315	293	343	375	263	302	358	131	164	192	158	
15	76.7	65.0	188	93.8	47.0	23.4	201	264	324	222	291	338	314	368	402	282	324	384	141	176	206	170	
16	81.8	69.3	200	100	50.0	25.0	214	282	346	237	310	360	334	392	429	301	346	410	150	187	219	181	
17	86.9	73.6	213	106	53.2	26.5	228	299	367	252	330	383	355	417	456	320	367	435	159	199	233	192	
18	92.0	77.9	225	113	56.3	28.1	241	317	389	266	349	405	376	441	482	338	389	461	169	211	247	203	
19	97.1	82.3	238	119	59.5	29.6	255	334	410	281	369	428	397	466	509	357	410	486	178	222	260	215	
20	102	86.6	250	125	62.6	31.2	268	352	432	296	388	450	418	490	536	376	432	512	188	234	274	226	
21	107	90.9	263	131	65.7	32.8	281	370	454	311	407	473	439	515	563	395	454	538	197	246	288	237	
22	112	95.3	275	138	68.9	34.0	295	387	475	326	427	495	460	539	590	414	475	563	206	257	301	249	
23	118	99.6	288	144	72.0	35.9	308	405	497	340	446	518	481	564	616	432	497	589	216	269	315	260	
24	123	104	300	150	75.0	37.4	322	422	518	355	466	540	502	588	643	451	518	614	225	281	329	271	
25	128	108	313	156	78.3	39.0	335	440	540	370	485	563	523	613	670	470	540	640	235	293	343	283	

For Methods of Using Table See Back of Sheet. The Heating and Ventilating Magazine's Data S

NG CONTRACTORS NATIONAL ASSOCI

ARD RADIATION ESTIMATING TABLE

ADIATION REQUIRED FOR QUANTITIES INDICATED

ation. For Other Construction than that Shown See Heating and Piping Contractors National Ass

WALLS											ROO		
Tile Pl.		Plain Conc.			Conc. Fur L. P.			Frame Std.	Frame No Sh'g	Frame No L. P.	T&G on 1" Bd.	T&G on 4" Conc.	S
"	12"	8"	12"	16"	8"	12"	16"						
6	.22	60	.48	41	.50	40	34	24	.31	35	30	60	
.3	12.1	33.0	26.4	22.6	27.5	22.0	18.7	13.2	17.1	19.3	16.5	33.0	
.7	18.6	6.8	8.5	10.0	8.2	10.2	12.0	17.0	13.2	11.7	13.6	6.8	
.4	37.2	13.6	17.0	20.0	16.4	20.4	24.0	34.0	26.4	23.4	27.2	13.6	
.1	55.8	20.4	25.5	30.0	24.6	30.6	36.0	51.0	39.6	35.1	40.8	20.4	
.8	74.4	27.2	34.0	40.0	32.8	40.8	48.0	68.0	52.8	46.8	54.4	27.2	
.5	93.0	34.0	42.5	50.0	41.0	51.0	60.0	85.0	66.0	58.5	68.0	34.0	
.2	112	40.8	51.0	60.0	49.2	61.2	72.0	102	79.2	70.2	81.6	40.8	
10	130	47.6	59.5	70.0	57.4	71.4	84.0	119	92.4	81.9	95.2	47.6	
26	149	54.4	68.0	80.0	65.6	81.6	96.0	136	106	93.6	109	54.4	
41	167	61.2	76.5	90.0	73.8	91.8	108	153	119	105	122	61.2	
57	186	68.0	85.0	100	82.0	102	120	170	132	117	136	68.0	
73	205	74.8	93.5	110	90.2	112	132	187	145	129	150	74.8	
88	223	81.6	102	120	98.4	122	144	204	158	140	163	81.6	
04	242	88.4	111	130	107	133	156	221	172	152	177	88.4	
20	260	95.2	119	140	115	143	168	238	185	164	190	95.2	
36	279	102	128	150	123	153	180	255	198	176	204	102	
51	298	109	136	160	131	163	192	272	211	187	218	109	
67	316	116	145	170	139	173	204	289	224	199	231	116	
83	335	122	153	180	148	184	216	306	238	211	245	122	
98	353	129	162	190	156	194	228	323	251	222	258	129	
14	372	136	170	200	164	204	240	340	264	234	272	136	
30	391	143	179	210	172	214	252	357	277	246	286	143	
45	409	150	187	220	180	224	264	374	290	257	299	150	
61	428	156	196	230	189	235	276	391	304	269	313	156	
77	446	163	204	240	197	245	288	408	317	281	326	163	
93	465	170	213	250	205	255	300	425	330	293	340	170	

NG CONTRACTORS NATIONAL ASSOC

ARD RADIATION ESTIMATING TABLE

ADIATION REQUIRED FOR QUANTITIES INDICATED

ation. For Other Construction than that Shown See Heating and Piping Contractors National A

E WALLS											RO	
Tile Pl.		Plain Conc.			Conc. Fur L. P.			Frame Std.	Frame No Sh'g	Frame No L. P.	T&G on 1" Bd.	T&G on 4" Conc.
"	12"	8"	12"	16"	8"	12"	16"					
26	.22	60	.48	.41	.50	.40	.34	.24	.31	.35	.30	.60
.4	8.80	24.0	19.2	16.4	20.0	16.0	13.6	9.60	12.4	14.0	12.0	24.0
.6	25.6	9.38	11.7	13.7	11.3	14.1	16.6	23.4	18.2	16.1	18.8	9.38
.2	51.2	18.8	23.4	27.4	22.6	28.2	33.2	46.8	36.4	32.2	37.6	18.8
.8	76.8	28.1	35.1	41.1	33.9	42.3	49.8	70.2	54.6	48.3	56.4	28.1
.4	102	37.5	46.8	54.8	45.2	56.4	66.4	93.6	72.8	64.4	75.2	37.5
08	128	46.9	58.5	68.5	56.5	70.5	83.0	117	91.0	80.5	94.0	46.9
30	154	56.3	70.2	82.2	67.8	84.6	99.6	140	109	96.6	113	56.3
51	179	65.7	81.9	95.9	79.1	98.7	116	164	127	113	132	65.7
73	205	75.0	93.6	110	90.4	113	133	187	146	129	150	75.0
94	230	84.4	105	123	102	127	149	211	164	145	169	84.4
16	256	93.8	117	137	113	141	166	234	182	161	188	93.8
38	282	103	129	151	124	155	183	257	200	177	207	103
59	307	113	140	164	136	169	199	281	218	193	226	113
81	333	122	152	178	147	183	216	304	237	209	244	122
02	358	131	164	192	158	197	232	328	255	225	263	131
24	384	141	176	206	170	212	249	351	273	242	282	141
46	410	150	187	219	181	226	266	374	291	258	301	150
67	435	159	199	233	192	240	282	398	309	274	320	159
89	461	169	211	247	203	254	299	421	328	290	338	169
10	486	178	222	260	215	268	315	445	346	306	357	178
32	512	188	234	274	226	282	332	468	364	322	376	188
54	538	197	246	288	237	296	349	491	382	338	395	197
75	563	206	257	301	249	310	365	515	400	354	414	206
97	589	216	269	315	260	324	382	538	419	370	432	216
18	614	225	281	329	271	338	398	562	437	386	451	225
40	640	235	293	343	283	353	415	585	455	403	470	235

ilating Magazine's Data Sheets Nos. 13 M 2 and 13 N 2

CIATION

Association Engineering Standards.

BOSTON

TEMPERATURE FACTORS		EXPOSURE FACTORS			
Room Temperature	70°=T_1	N	1.30	S	1.00
Base Temperature	+15°=T_0	NE	1.10	SW	1.30
Base Temp. +15° Equivalent to		E	1.00	W	1.30
Guarantee Temp. of —0° Outside		SE	1.00	NW	1.30

OOF			Base Floor		Interm'e Floor			Ceiling		Partition			Type
	Sh'gle on Sh'g	Sh'gle Sh g L. P.	Conc. on Earth	Wood on Sleep.	4" Conc.	4" Conc. 3" Fill 1" Fin.	Double Wood	Lath and Plas.	L & P Wo. Fl. Over	Stud L & P 1 Side	Stud L & P 2 Side		Kind
													Thick.
	40	30	31	13	20	15	20	49	28	.60	.33		K
0	22.0	16.5	8.55	3.58	5.5	4.13	5.5	13.5	7.7	16.5	9.08		K(T1-T0)
8	10.2	13.6	26.3	62.9	40.9	54.5	40.9	16.7	29.2	13.6	24.8		1
6	20.4	27.2	52.6	126	81.8	109	81.8	33.4	58.4	27.2	49.6		2
4	30.6	40.8	78.9	189	123	164	123	50.1	87.6	40.8	74.4		3
2	40.8	54.4	105	252	164	218	164	66.8	117	54.4	99.2		4
0	51.0	68.0	132	315	205	273	205	83.5	146	68.0	124		5
8	61.2	81.6	158	377	245	327	245	100	175	81.6	149		6
6	71.4	95.2	184	440	286	382	286	117	204	95.2	174		7
4	81.6	109	210	503	327	436	327	134	234	109	198		8
2	91.8	122	237	566	368	491	368	150	263	122	223		9
0	102	136	263	629	409	545	409	167	292	136	248		10
8	112	150	289	692	450	600	450	184	321	150	273		11
6	122	163	316	755	491	654	491	200	350	163	298		12
4	133	177	342	818	532	709	532	217	380	177	322		13
2	143	190	368	881	573	763	573	234	409	190	347		14
2	153	204	395	944	614	818	614	251	438	204	372		15
9	163	218	421	1006	654	872	654	267	467	218	397		16
6	173	231	447	1069	695	927	695	284	496	231	422		17
2	184	245	473	1132	736	981	736	301	526	245	446		18
9	194	258	500	1195	777	1036	777	317	555	258	471		19
6	204	272	526	1258	818	1090	818	334	584	272	496		20
3	214	286	552	1321	859	1145	859	351	613	286	521		21
0	224	299	579	1384	900	1199	900	367	642	299	546		22
6	235	313	605	1447	941	1254	941	384	672	313	570		23
3	245	326	631	1510	982	1308	982	401	701	326	595		24
0	255	340	658	1573	1023	1363	1023	418	730	340	620		25

← These Items Figured on Basis of K $\left(\frac{T_1-T_0}{2}\right)$ →

CIATION

al Association Engineering Standards.

MEMPHIS

TEMPERATURE FACTORS		EXPOSURE FACTORS			
Room Temperature	70°=T_1	N	1.40	S	1.30
Base Temperature	+30°=T_0	NE	1.20	SW	1.30
Base Temp. +30° Equivalent to		E	1.10	W	1.40
Guarantee Temp. of +15° Outside		SE	1.00	NW	1.40

ROOF			Base Floor		Interm'e Floor			Ceiling		Partition			Type
G 4" nc.	Sh'gle on Sh'g	Sh'gle Sh'g L. P.	Conc. on Earth	Wood on Sleep.	4" Conc.	4" Conc. 3" Fill 1" Fin.	Double Wood	Lath and Plas.	L & P Wo. Fl. Over	Stud L & P 1 Side	Stud L & P 2 Side		Kind
													Thick.
60	.40	.30	.31	.13	.20	.15	.20	.49	.28	.60	.33		K
.0	16.0	12.0	6.20	2.60	4.00	3.00	4.00	9.80	5.60	12.0	6.60		K(T1-T0)
38	14.1	18.8	36.3	86.5	56.3	75.0	56.3	23.0	40.2	18.8	34.1		1
.8	28.2	37.6	72.6	173	113	150	113	46.0	80.4	37.6	68.2		2
.1	42.3	56.4	109	260	169	225	169	69.0	121	56.4	102		3
.5	56.4	75.2	145	346	225	300	225	92.0	161	75.2	136		4
.9	70.5	94.0	182	433	282	375	282	115	201	94.0	171		5
.3	84.6	113	218	519	338	450	338	138	241	113	205		6
.7	98.7	132	254	606	394	525	394	161	281	132	239		7
.0	113	150	290	692	450	600	450	184	322	150	273		8
.4	127	169	327	779	507	675	507	207	362	169	307		9
.8	141	188	363	865	563	750	563	230	402	188	341		10
03	155	207	399	952	619	825	619	253	442	207	375		11
13	169	226	436	1038	676	900	676	276	482	226	409		12
22	183	244	472	1125	732	975	732	299	523	244	443		13
31	197	263	508	1211	788	1050	788	322	563	263	477		14
41	212	282	545	1298	845	1125	845	345	603	282	512		15
50	226	301	581	1384	901	1200	901	368	643	301	546		16
59	240	320	617	1471	957	1275	957	391	683	320	580		17
69	254	338	653	1557	1013	1350	1013	414	724	338	614		18
78	268	357	690	1644	1070	1425	1070	437	764	357	648		19
88	282	376	726	1730	1126	1500	1126	460	804	376	682		20
97	296	395	762	1817	1182	1575	1182	483	844	395	716		21
06	310	414	799	1903	1239	1650	1239	506	884	414	750		22
16	324	432	835	1990	1295	1725	1295	529	925	433	784		23
25	338	451	871	2076	1351	1800	1351	552	965	451	818		24
35	353	470	908	2163	1408	1875	1408	575	1005	470	853		25

N 2

← These Items Figured on Basis of K $\left(\frac{T_1-T_0}{2}\right)$ →

How to Use the Boston Table

Figure from the plans the number of square feet of wall, glass and lineal feet of crack for each exposure. Find the nearest corresponding quantity in appropriate column. Then read horizontally to extreme right or left-hand column for square feet of radiation required. Add additional amount for exposure, as shown in upper right-hand square of data sheet.

For example, for Boston: 70 sq. ft. 12-in. brick wall. Read down the column headed "Plain Brick 12-in."; the figure in the table falls between 64.0 and 76.8. Following horizontally to extreme left or right shows 5.6 sq. ft. of 38-in. 3-col. radiation. If wall faces north, multiply by 1.30, making 7.28 sq. ft. actually required.

If same wall has 30 sq. ft. of glass or door, the nearest corresponding amount under "Glass" is 8 sq. ft. This figure multiplied by exposure factor 1.30 equals 10.4 sq. ft. If window has 39 lin. ft. and is double-hung wood sash, without weather strips, the nearest corresponding figure in the table (using the column headed "50" under "Infiltration") is 40.5, or the equivalent of 9 sq. ft. of radiation. Multiplying by 1.30 for exposure equals 11.7 sq. ft. of radiation.

The three quantities—7.28, 10.4 and 11.7—equal 29.38 or, for simplicity, 30 sq. ft. as the total amount of radiation required for this exposure. The three quantities for any one exposure can be added together and then multiplied by the exposure factor to obtain the same result. No exposure factor is to be used for roofs, floors, ceilings, or partitions or skylights, unless skylights are vertical or practically vertical.

The factor in the last column is the number of B.T.U. per lineal foot of crack per hour per degree difference in temperature.

UNIV. OF MICH.

How to Use the Memphis Table

Figure from the plans the number of square feet of wall, glass and lineal feet of crack for each exposure. Find the nearest corresponding quantity in appropriate column. Then read horizontally to extreme right or left-hand column for square feet of radiation required. Add additional amount for exposure, as shown in upper right-hand square of data sheet.

For example, for Memphis: 70 sq. ft. 12-in. brick wall. Read down the column headed "Plain brick 12-in."; the nearest corresponding figure in the table is 70.4. Following horizontally to extreme left or right shows 4 sq. ft. of 38-in. 3-col. radiation. If wall faces north, multiply by 1.40, making 5.6 sq. ft. actually required.

If same wall has 30 sq. ft. of glass or door, the nearest corresponding amount under "Glass" is 6 sq. ft. This figure multiplied by exposure factor of 1.40 equals 8.4 sq. ft. If window has 39 lin. ft. of crack and is double-hung wood sash, without weather strips, the figure in the table (using the column headed "50" under "Infiltration") would fall between 37.5 and 43.8, or 6.5 sq. ft. of radiation. Multiplying by 1.40 for exposure equals 9.1 sq. ft. of radiation.

The three quantities of radiation—5.6, 8.4 and 9.1—equal 23.1 or, for simplicity, 23 sq. ft. as the total amount of radiation required for this exposure. The three quantities for any one exposure can be added together and then multiplied by the exposure factor to obtain the same result. No exposure factor is to be used for roofs, floors, ceilings, or partitions or skylights, unless skylights are vertical or practically vertical.

The factor in the last column is the number of B. T. U. per lineal foot of crack per hour per degree difference in temperature.

Edward L. Wilder, Rochester Gas & Elec. Corp., Rochester, N. Y.
J. Earl Seiter, Detroit Edison Co., Detroit, Mich.
H. E. Blosser, Lockport Light, Heat & Power Co., Lockport, N. Y.
Landis Shaw Smith, Rochester Gas & Elec. Corp., Rochester, N. Y.
Fred S. Coombs, Penn-Ohio Power & Light Co., Youngstown, Ohio.
Norman W. Calvert, The Detroit Edison Co., Detroit, Mich.
Philip F. Stephens, Rochester Gas & Elec. Corp., Rochester, N. Y.
R. G. Felger, Detroit-Edison Co., Detroit, Mich.
Henry Meyer, Citizens Mutual Htg. Co., Terre Haute, Ind.
William M. White, American Gas Co., Philadelphia, Pa.
A. A. Sellke, Detroit Edison Co., Detroit, Mich.
W. H. Grover, L & K Heating Co., Toledo, Ohio.
R. R. Jewell, The Ohio Service Co., New Philadelphia, Ohio.
James Wendell Renneckar, The Ohio Service Co., Philadelphia, Pa.
H. A. Lawrence, Cleveland Elec. Ill. Co., Cleveland, Ohio.
R. G. Bohn, Commonwealth Power Corp., Jackson, Mich.
A. J. Slade, American District Steam Co., N. Tonawanda, N. Y.
L. W. Hoskins, L. W. Hoskins Co., Chicago, Ill.
J. L. Hornung, Chicago, Ill.
W. J. Kline, American District Steam Co., N. Tonawanda, N. Y.
H. C. Kimbrough, American District Steam Co., Chicago, Ill.
Harold W. Coombs, E. B. Badger & Sons Co., Boston, Mass.
J. V. Redfield, Central Station Steam Co., Detroit, Mich.
M. J. Miller, Diamond Power Specialty Corp., Detroit, Mich.
Ivan S. Forde, Diamond Power Specialty Corp., Detroit, Mich.
C. Gottwald, Ric-wil Company, Cleveland, Ohio.
F. A. Annett, **Power,** New York City.
W. K. Abernethy, Central Station Steam Co., Chicago, Ill.
A. S. Armagnac, **The Heating and Ventilating Magazine,** New York.
George Fabrice, Jr., Drying Systems, Inc., Chicago, Ill.
J. G. Goodhue, Drying Systems, Inc., Chicago, Ill.
Frederick R. Heath, E. B. Badger & Sons Co., Boston, Mass.
David T. Wallace, Central Station Steam Co., Detroit, Mich.
Chas. E. Mallery, Grinnell Co., Inc., Warren, Ohio.
E. T. Keefe, Underground Steam Const. Co., Boston, Mass.
A. W. Moulder, Grinnell Co., Inc., Warren, Ohio.
P. A. Hyde, The Ohio Edison Co., Springfield, O.
A. T. Veness, Rochester Gas & Elec. Corp., Rochester, N. Y.
J. J. Schenk, Rochester Gas & Electric Co., Rochester, N. Y.
Fred G. Austin, Rochester Gas & Elec. Corp., Rochester, N. Y.
Charles H. Day, Cleveland Elec. Ill. Co., Cleveland, Ohio.
Fred B. Orr, Illinois Maintenance Co., Chicago, Ill.
Fred J. Elter, Rochester Gas & Elec. Corp., Rochester, N. Y.
Ralph T. Coe, Warren Webster & Co., Camden, N. J.
C. A. Woodruff, Rochester Gas & Elec. Corp., Rochester, N. Y.
George W. Martin, New York Service Co., New York.

District Heating Outlook As Seen By Leaders of the Industry

IMPRESSIONS of the trend of events as disclosed at the recent annual convention of the National District Heating Association and what the future holds in store for the industry are given in the accompanying expressions from men whose position on the firing line qualifies them to an exceptional degree correctly to interpret the important movements now going on in the district heating field.

Charles H. Day, superintendent Steam Heating Department, The Cleveland Electric Illuminating Company—I think the outstanding feature of the N.D.H.A. Niagara Falls meeting can be summed up in the one word "Service." To my mind the efforts of the joint committee representing both the building owners and the operating companies, as evidenced in the "Manual on Heat Saving," is a long stride toward an ideal relation that is reached in but very few industries.

There is very little to be said relative to the other technical phases of the operation of central station heating systems; except that the reports show a large amount of work and thought expended by all with the one aim in view of reducing operating charges.

Such discussions show a healthy interest in the problems involved that cannot help but react favorably to the industry at large.

District Heating Business Entering New Era

H. R. Wetherell, Technical Secretary, National District Heating Association—There is no question that this was the best convention ever held by the association; i. e., from the standpoint of attendance, technical discussion, and entertainment.

It is my opinion that the district heating business is now entering a new era and when some of the new operating ideas brought out in this convention are put into practice, this department of the utilities business will be put upon a paying basis.

Quite a number of the companies located in the larger cities, during the past two years have extended their service to cover more territory, and, in some cases, have built new and up-to-date plants. It is my opinion that the next ten years will show rapid strides in the development of district heating throughout the entire United States.

Characteristics of Ideal District Heating System

David Caleb, Kansas City (Mo.) Power and Light Company—The National District Heating Association, at its recent Niagara Falls convention, enjoyed the largest attendance in its convention history. This convention has grown to a point where the nation's heating experts bring their problems and the results of extensive research for discussion by their fellows.

There was a time when district heating was a novelty of which little was known, and the lack of experience and excess enthusiasm of certain advocates gave rise to systems operating under conditions that prevented any chance of financial success. These cases are becoming increasingly rare, as necessity and experience have resulted in careful study of the basic principles underlying the success of district heating systems. There is a district field, controlled by physical and financial limitations beyond which the district heating system cannot venture.

It follows that the ideal system is one so designed as to obtain the maximum load within its district and to grow with the district so that the increasing maximum load available can be handled at the uniformly lowest cost per 1000 lbs. of steam delivered.

The studies necessary to the end were presented to the Niagara Falls convention by the Distribution Committee and constitute a discussion of the balance of the cost of various steam heating systems against the ultimate cost of steam delivered at various pressures—both high and low. From these data and the character and size of the load to be served, the engineer considering a district heating system can evolve a plan with the greatest possible load factor and least possible cost. A combination of these two items will inevitably tend to success of the venture.

There has been considerable discussion of the use of bleeder or back-pressure turbines used to generate electric energy in connection with a district heating system. There are conditions under which the procedure is entirely a financial success, and the report covers this subject completely. It must be borne in mind, however, that each system and generator installation has its own peculiar problems—there have been installations in the past that do not enjoy the successes of plants installed as the result of careful study such as was outlined in the report of the Distribution Committee.

BULLETIN OF THE CARNEGIE INSTITUTE OF TECHNOLOGY, containing the proceedings of the second annual three-day institute held last fall by the Department of Heating, Ventilating and Plumbing, has been issued by the Department of Industrial Relations of the Institute. Included in the contents are Professor E. Dibble's lecture on boiler rating, Professor Thomas G. Estep's lectures on combustion and chimney sizes, two talks by Professor Roy B. Ambrose on boiler testing, a lecture by Professor Harold A. Thomas on "Flow of Water in Pipes and Fittings," and the address of Director F. C. Houghten, of the A.S.H. & V.E. Research Laboratory, on "Value of Research Work in Plumbing and Heating Industry." The bulletin is listed at $1.00 and has been edited by Professor Samuel E. Dibble. Size 6 x 9 in. Pp. 104.

Central Station Steam Plants in New York City

By William J. Baldwin

Chief Engineer, Commercial Department, New York Steam Corporation.

(From an address before the annual convention of the National District Heating Association, at Niagara Falls, June 1.)

CENTRAL station steam or heating plants are unquestionably essential to the best growth of most cities where fuel in large quantities is required for heating and other steam purposes and particularly in New York. Whether such plants can always be made profitable investments depends necessarily on many things and conditions which vary in different localities.

The outstanding points in favor of these plants are, first, cleanliness and safety, which mean health and security to the community; second, utility, which means adequate and convenient service; and, third, economy, which means conservation of fuel as much as anything else.

The large capital investment, plus high operating costs, makes the margin of profit in some locations small as compared with other allied public utilities, more particularly at their inception and during their early development.

The city, State and public utility commissions should encourage such plants in every practicable way. Without this spirit of co-operation, the growth of these plants must necessarily be slow. Even under most favorable conditions the new central station steam plant in many locations cannot be more than self-sustaining during a comparatively long development period.

BUSINESS DOUBLED IN LAST TEN YEARS

In New York City the original plants were started forty-five years ago. Their growth was slow until within the past ten years, and particularly within the past five years, during which time, however, the total business has doubled and is growing rapidly, although only two small sections of the city have been covered.

The future possibilities of central steam plants in this congested city are beyond conception. It is so closely built that extensions in almost any direction are reasonably safe undertakings. One can vaguely imagine only by comparing the cost of electric service in buildings generally with that of steam service, what the ultimate may be.

PRINCIPLES UNDERLYING SUCCESSFUL OPERATION

Central station steam plants can only be successful when carried on under strictly sound principles of finance, economy and engineering. Far-sightedness is essential to spreading in the proper direction. It is necessarily the most densely-built district that should first be reached. A development in a district where building has lagged and where a building boom is contemplated will often result in a large volume of most desirable business. It is easier to procure new buildings at the time of their erection when the owners can save the initial investment of boiler plants, than it is to procure buildings where such investment has been made.

Where the new central station steam plant is supported by some other allied utility in the community, the chances of its success are greater.

In New York City, the things that mitigate to the successful growth of central station steam plants are chiefly the congested building developments, the high cost of coal (domestic sizes), labor conditions and the high rental value of basement space made possible by the elimination of boilers, coal bunkers, etc. An essential is the flexibility of the rates as applied to different types of buildings depending chiefly on their load factor and the quantity of steam used.

SOME OF THE PRINCIPAL OBSTACLES

The obstacles in New York are the high cost of land at desirable locations for central station boiler plants, the high cost of construction generally and the difficulty encountered in laying street mains, due to the congested and complex subsurface conditions caused by the subways and innumerable water, sewer, gas and electric mains, and tide conditions, all of which make for very high cost of installing street mains and their maintenance. Such mains must be installed and kept up under rigid city and public service requirements as to type of construction and conditions under which the street work must be done (often at night to prevent traffic congestion).

CONDITIONS PRIOR TO 1922 AND SINCE

Due to causes beyond the control of the original company, the growth of central station steam plants in New York City prior to 1922 was not highly satisfactory. The reorganization of the company at that time made future developments possible and successful. Boiler plants and old-type street mains had to be revamped, while new street mains were being laid under unusual conditions during the past five years.

In 1922 the capital investment was about $10,000,000.00, covering boiler plants, street mains, equipment, etc. At that time a gross annual business of slightly over $3,000,000.00 was producing a net of approximately $500,000.00, after taxes, to apply on capital invested.

RECENT INCREASES IN CAPITAL

In 1925 the capital investment increased about 50% to approximately $15,000,000.00 due to remodeling boiler plants, renewing old mains and laying new ones, during which time any very considerable increase in gross business, revenue or profit was not possible. The gross business then was slightly less than $4,000,000.00, producing approximately $1,000,000.00, after taxes, principally due to improved efficiency in plant operation and distribution.

The close of 1926 will show a total capital investment of about $18,000,000.00 with a net, after taxes, of at least $1,500,000.00 on a gross annual business of about $5,500,000.00. This does not include the contemplated new boiler plant investment.

For the purpose of quick figuring, let us divide this capital expenditure and assume the boiler plant investment at $6,000,000.00, including properties, the street investment at $10,000,000.00, the meter and equipment investment $1,500,000.00, and the balance miscellaneous.

POSSIBILITIES OF FUTURE DEVELOPMENT ON PRESENT MAINS

The boiler plant capacity is 75,000 B. H. P. fully developed. The street mains and branches will total 200,000 lin. ft., which include branch or service lines. The carrying capacity of the mains will not have been reached, and the possible available additional business which ultimately can be procured on these present mains is very substantial, possibly 28% or over in addition to the present load. This indicates to a degree what the future development on the present mains may be at a very slight additional capital expenditure for meter equipment and service lines.

Additional boiler plants and mains, if added only a step in advance of sales, or better still, if a considerable part of the sales can be made slightly in advance of any new development, which is possible in New York, the investment can be made to earn carrying charges almost from the start and thereby not become a burden or seriously affect

present earnings. This growth or development must necessarily be limited somewhat each year by the number of feet of street mains which can be laid during a short period in the summer when the city will permit a limited length of streets to be opened. It would seem that a future growth now each year of from $1,000,000.00 to $2,000,000.00 gross revenue is reasonably certain while laying 10,000 to 20,000 ft. of mains. The bulk of this new business would be on the new mains and a small portion on the mains already laid.

ECONOMICAL OPERATION MAKES HIGHER STEAM RATES POSSIBLE

At the inception of new central station steam plants and until satisfactory earnings are absolutely assured, steam must be sold at as high an advance over production cost as is reasonably possible, and one of the principal ways this can be done is to educate the consumers in the matter of handling their equipment for economy and eliminate all possible waste. The elimination of steam waste places the central station steam plant in successful competition with the wasteful isolated boiler plant and steam-using equipment.

COMPARATIVE FIGURES

The following very approximate figures may be of some value for comparisons.

The total cubic space (in buildings) served per lineal foot of street mains and branches is approximately 4,000 cu. ft. (200,000 ft. of street mains and branches divided into 800,000,000 cu. ft. of buildings served). This is equivalent to a 100-ft. deep by 75-ft. high building built solid on the street front for every lineal foot of steam mains, not including service branches, or equal to a six-story building built solid for the entire block or street frontage and 100 ft. deep, allowance being made for street intersections.

The approximate cost per lineal foot of main and branches may be assumed at $50.00 per foot.

We may assume a capital expenditure for all purposes at $90.00 per foot of mains and branches which is applicable in New York City.

On the basis of an average of 6½ lbs. of steam sold per cubic foot of building space on the above basis (4,000 cu. ft. of space per lineal foot of main, and branches, 200,000 ft.) at an average price of 95c per 1000 lbs., a gross income per lineal foot of street pipes of approximately $26.00 would result. On this basis it would seem reasonable to expect a satisfactory net return on a total capital investment of $90.00 (boiler plant, street mains, equipment, etc.) per lineal foot of street mains and branches. Assuming that the cost of street mains is slightly less than one-half the total capital investment, a gross sale of $50.00 would warrant a street main investment of $100.00 or a total capital investment of $200.00.

While the above may be a rule of thumb, or, as we might say, one of the yardsticks for measuring in advance the successful growth and development in New York City, it would not apply where street work can be done at a very much lower cost. Of course, the margin between the production cost of steam and the average selling price must have an all important bearing on what is and what is not a profitable development, and here we come to a very important phase of this business, a rate schedule flexible enough to apply to almost any desirable business.

NECESSITY FOR FLEXIBLE RATE SCHEDULES

If the development is into a district where the bulk of the buildings are hotels, apartment houses and club buildings closely built and of large cubage, the cost at which steam is sold need not be as low as the lowest possible production cost in these buildings for the reason that many other considerations enter into the problem of selling steam to this type of building, such as the convenience of the service, cleanliness, noiselessness and the elimination of all the inconveniences caused by handling coal-fired boilers. There is also the greater possible operating efficiency of the heating apparatus with central station service. The rate per 1000 lbs. can therefore be kept reasonably higher than the average cost of steam production in these isolated plants.

Where the development is into a strictly manufacturing or power-plant district, where the isolated plant can produce steam at a minimum cost due to capable engineering operation and steam waste elimination, the rate which the central station plant can successfully charge must be at a fairly close margin of profit. Usually these plants do not have as desirable a twenty-four hour load factor as the apartment hotel heating plant, but the total volume of power steam business over a twelve months' period is so large per cubic foot of space, compared with a strictly heating plant, and the monthly load factor is so constant, that it is logical to develop a rate which will be attractive to this class of consumer.

The development into a strictly residential district is probably the most trying, particularly in residential sections where people of modest means reside and where in many cases the heating systems are operated by a member of the family or by a servant in the house. In this class of residence the cost for heating is reduced to a possible minimum by elimination of labor expense and thrift in operation, although plant efficiency may be low. The evaporation per ton of coal is lower in residences than in any other type of building and domestic-size coal is very much higher in cost. This is the salvation of the central station steam plant. These two factors alone make it possible to get even a reasonable part of this business at a profitable rate. In this type of building, the cost of steam service must be kept but very slightly higher than the consumer's cost to produce. In districts where the residence owners are people of means, the matter of convenience again enters into the subject of steam service and the consumer will pay a fair increase for the convenience of the service. Therfore, the question of rates for strictly residential sections is one which needs the most careful consideration.

In New York City we have not had to any extent the problem of adjusting rates to meet the low cost of small residence operation. In business sections of the city, where small consumers rent lofts or parts of buildings for light manufacturing or for restaurant use, etc., the convenience of the service is so paramount that the matter of cost is secondary. This makes this business profitable at the sliding quantity rate applicable to these small-demand consumers, which rate must of necessity be high because of the relatively large capital investment for service lines, meters, equipment, etc.

THE PROBLEM OF THE SMALL-RESIDENCE CONSUMER

When the small-residence consumers become very numerous as compared with the total, the maintenance expense (distribution and commercial) runs up quickly. In this respect it makes a difference whether the average use per year per consumer is (as in New York City) 2,500,000 lbs., or only 500,000 lbs. or less where the percentage of small consumers is high. Here, again, we might dwell briefly on the advisability of teaching the consumer how to economize with central station steam service and eliminate waste in every possible way by using control devices, weather stripping and utilizing the heat in the condensate. We can again see the great advantage of having the owners eliminate boilers, flues and chimneys, coal bunkers, boiler piping and equipment from their plans before the buildings are erected and thus save a considerable investment and subsequent carrying charge. This puts the central station service on a more favorable competitive basis than where the isolated plant investment has already been made.

If the steam production cost in the central station steam plant, including plant depreciation, steam loss, etc., is 50% of the total sales and we add 8% for distribution, 2½% for commercial and 4% for general, we have a total of 64½% of gross sales chargeable to steam cost before interest and taxes, leaving 36½% of gross sales for the interest and taxes, or $1,825,000.00 on a gross $5,000,000.00 sales to apply to interest and taxes which, on a total capital investment of $18,000,000 is 10%. Assume, in place of 2,000 consumers in New York City at 2,500,000 lbs. per consumer, we averaged 500,000 lbs. per con-

sumer, it would represent 10,000 consumers, or five times as many as now, and would likely add 100% to present distribution and commercial expense or total approximately 21% for distribution and commercial and at least 1% more to general, or a total of 76% of gross sales chargeable to steam before interest and taxes, leaving 24% of gross sales for interest and taxes or $1,200,000.00 on a gross sales of $5,000,000.00 which is slightly more than 6½% on an $18,000,000.00 investment.

This indicates in that condition that the average sale rate must be increased, the cost of production lowered or the capital investment greatly reduced. The latter two (cost of production and capital investment), can hardly be lowered to any noticeable extent in New York City.

PRESENT RATES CONDUCIVE TO PROFITABLE RETURNS

This brings us to the conclusion that conditions in New York City are conducive to profitable returns from central station steam plants under present rates, production and operating costs and required capital investments, and are likely to remain so as long as extensions are confined to the sections of the city closely built where a fair percentage of the business consists of large commercial buildings, apartment hotels and high-class residences.

Since the reorganization from 1922 to date, as the increased volume of business and the improved plant and distribution efficiencies made it possible, the rates have been steadily reduced without affecting earnings so that, while the average selling price in 1922 was slightly over $1.11 per 1000 lbs. of steam, the average price in 1925 was slightly less than 95c per 1000 lbs. and for 1926 would have been close to 90c per 1000 lbs. if it had not been for the coal strike, which increased the coal surcharge slightly due to the necessity of storing and handling a large amount of coal which otherwise would not have been stored. The average cost per year to the large power consumers due to unusually good load factors and large volume, is in some cases as low as 65c per 1000 lbs. of steam, while consumers who use the minimum quantity per month will approximate $1.95 per 1000 lbs., which, in each case, includes normal coal surcharge.

CONDITIONS LIKELY TO OBTAIN AT CLOSE OF 1926

The following approximate figures will likely apply at the close of 1926 in New York City:

1. Capital investment, $18,000,000.00.
2. Capital investment per consumer, $9,000.00.
3. Total capital investment per foot of mains, $90.00 (Plants, mains, equipment, etc.).
4. Capital investment in street work alone per foot of street mains, $50.00.
5. Capital investment per 1000 cu. ft. of space served, $22.50.
6. Capital investment per 1000 lbs. of steam sold per year, $3.27.
7. 2,000 consumers averaging 2,750,000 lbs. of steam used per year per consumer.
8. 200,000 ft. of mains and branches supplying 800,000,000 cu. ft. of space (2,000 consumers).
9. Sales estimated, 5,500,000,000 lbs. at an average of 95c per 1000 lbs.
10. Average pounds of steam sold per year per 1000 cu. ft. of building space estimated at 6,875 lbs. This high average is due to the large number of large apartment hotels and office buildings operating generators and elevator pumps.
11. Gross revenue estimated at $5,225,000.00.
12. Gross revenue per foot of mains, $26.12.
13. Revenue average per consumer yearly, $2,612.50.
14. Production expenses of all kinds estimated at 45c per 1000 lbs. of steam sold (coal at $4.50 per gross ton in bunkers).
15. Distribution expenses, 8c per 1000 lbs. of steam sold.
16. Commercial expenses, 2½c per 1000 lbs. of steam sold.
17. General expenses, 4c per 1000 lbs. of steam sold.
18. Total expenses before taxes, 59½c per 1000 lbs. of steam sold.
19. Net after taxes, 30½c. per 1000 lbs. of steam sold.
20. Approximately 70,000 lbs. of steam sold per year per plant B.H.P.

Free Engineering by Jobbers

One of the subjects which occupied a prominent place on the program at the recent meeting of the Central Supply Association was the subject of "Free Engineering by Jobbers." It was brought out that in Indianapolis, a committee of contractors had asked the jobbers in that city to discontinue the practice of engineering small domestic heating jobs for small operators. One jobber took the position that it was rather essential to do this and that it protected the public from having to accept jobs that were worthless, due to the fact that they had not been properly engineered. The same speaker cited a job which had been properly engineered, but which was rendered inefficient through the lack of engineering supervision, by permitting the use of cheaper materials and cutting the work generally.

On the other hand, it was brought out that engineering by jobbers appeared in the overhead costs. The thought was expressed that the practice could not continue or gain headway in those communities having contractor organizations. It was stated that the practice of furnishing engineering had been used by some jobbers to win over small accounts, as well as keep those of small-caliber plumbing and heating contractors.

Chicago's Mail Campaign for Certified Heating

Efforts of the Chicago Master Steam Fitters' Association to further certified heating is evidenced by the direct-mail campaign which the association is conducting among prospective customers in that city. It is pointed out in this correspondence that the steam fitters are faced with a surplus of work in winter amounting, on the average, to 35%, while during the summer months, there is only a sufficient demand to employ 65% of the personnel.

Inspections, the circulars go on to say, should be made before heat is shut off for the summer season; operators will then have the service of the pick of journeymen steam fitters, who will be able to work under ideal conditions, all of which will result in a material saving in cost. One of the features of the association's circular is a list of members who are qualified to furnish certified heating.

Chimneys One Meets in the Far West

Homer R. Linn, of the American Radiator Company, is back in Chicago after several weeks spent on the Pacific Coast and in the West, also three weeks in the South. In writing of his trip in *The Illinois Chapter* for May, Mr. Linn states:

"On both of these trips I found two very prominent complaints regarding heating installations; one was the prevalence of poor, inadequate chimneys, and the other was in connection with vapor systems, of grease in the water due largely to grease in the piping system.

"In California I saw heating plants installed in cellarless houses where the top of the chimney would be not more than 8 to 9 ft. above the grate in the boiler and sometimes this chimney would not be more than 6 x 6 in.

"I found the same condition in the South, except that they would often have the proper chimney area but seemed to think that if the chimney extended a foot or so above a low roof, it should work all right.

"There seems to be no concerted action at the present time in either California or the South to educate the building contractors to install adequate, tight chimneys.

"I talked before the Cincinnati Master Steam Fitters' Association, Cincinnati, March 4, on this subject, and also before the Southern Oil Burner Association, in Atlanta, Ga., March 5, and all that was necessary was to start a discussion on either one of these faults and the meeting would run itself after that."

Heating and Piping Contractors National Association

Heating Contractors Devise Solution of Boiler Rating Problem

Definite Plan Presented at Annual Convention—Success of Engineering Standards and of Certified Heating Hailed As Outstanding Achievements of the Year

RATINGS of house-heating boilers, based upon actual output tests, moved a step nearer toward realization as the result of action taken at the thirty-seventh annual convention of the Heating and Piping Contractors National Association, held in Washington, June 1-4, at the Willard Hotel. The enormous amount of work on this subject, carried out by the association's Boiler Output Committee, under the leadership of Past President George M. Getschow, chairman, was reflected in the committee's report, which was enthusiastically received, while the recommendations themselves were unanimously adopted by the convention.

The significant statement was made in the report that, of the forty-six house-heating boiler manufacturers who have received the committee's chart and formula, thirty-four have expressed themselves as favorable to the proposition of testing their boilers according to the formula and chart. Five manufacturers have actually submitted to the committee eighty complete output charts.

H. M. Hart,
President, Heating and Piping Contractors' National Association

MR. HART is president of the L. H. Prentice Co. of Chicago, one of the best-known engineering and contracting concerns in the Middle West. The firm has recently rounded a half century of service, having been established in 1877 by Messrs. Hay and Prentice. Quite recently, the management purchased and now occupies a three-story brick building at 1048-1050 W. Van Buren St., Chicago.

Mr. Hart has been identified with the company since 1900 and has held successively the positions of junior engineer, secretary, vice-president and now president and general manager. An expert mechanical engineer, Mr. Hart has long been prominent in engineering and construction circles, where his executive ability, enterprise and foresight have won him an enviable reputation. He is a past president of the Chicago Master Steamfitters' Association and of the American Society of Heating and Ventilating Engineers.

As Mr. Getschow modestly stated in submitting his report, the committee is "of the opinion that the progress made is a reasonable one, considering the labor and great expense which are attached to the manufacturer in testing and charting the output of his boilers."

In the direction of standardization, the work of the year may perhaps best be characterized as a period of achievement. A widespread interest was reflected in the association's Engineering Standards, comprising the Standard Radiation Estimating Tables for some twenty-four cities (now appearing serially in THE HEATING AND VENTILATING MAGAZINE). Due in part to the publicity given Engineering Standards, their use has been extended to a point where they are coming to be accepted as standard practice throughout the heating field. In addition, Chairman Walter L. Fleisher, of the

Afternoon Session, June 2

Fully 400 members and guests were assembled in the ballroom of the Willard Hotel when President Frank A. Merrill called the convention to order for its first formal session, Wednesday afternoon. At the invitation of President Merrill, the large audience rose to its feet and sang "America." President Merrill then said that he would dispense with his address of welcome and would suggest instead that each member constitute himself a committee of one to help make all welcome, especially as all sessions of the convention would be open sessions. He asked all manufacturers, jobbers and their representatives to mingle and to participate in the proceedings.

Lieut.-Colonel J. Franklin Bell, engineer commissioner of the District of Columbia, was then introduced. In the course of a short address, interspersed with humorous sallies, he figuratively offered the delegates and visitors the freedom of the city.

"It is a fine thing," declared Colonel Bell, "for engineers to interest themselves in civic affairs. I can talk your language and I have learned what you have done to improve the standards in your industry.

"Here in the District of Columbia, we have an architects' advisory council to pass on building plans. It has no authority to reject plans, but can make suggestions for changes. However, an architect that would balk at the council's suggested changes, naturally would lose standing in his profession."

CONVENTION COMMITTEES

Following Colonel Bell's address, President Merrill announced the following convention committees:

Credential Committee: F. S. Spencer, Minneapolis, Minn.; Fred Lorne, Detroit, and N. W. Lunda, Memphis, Tenn.

Auditing Committee: William H. Curtin, Brooklyn; Harry Geiser, Newark, N. J., and L. G. Kirk, New York.

Association Publicity, Relationship and Improvement: Joseph H. Volk, Milwaukee, Wis.; M. L. Crowell, Cleveland, O.; J. H. Hicks, St. Louis, Mo.; Theodore

G. Lohman, Los Angeles, Cal.; and Herbert A. Snow, Boston.

Nominating Committee: Harry G. Black, Philadelphia; John T. Bradley, St. Louis, Mo.; E. J. Claffey, Chicago, Ill.; George H. Drake, Buffalo; and William D. Emery, New York.

Resolutions Committee: John T. Baldwin, Chicago; Frank W. Howard, Boston; and J. E. Rutzler, New York.

Merle Thorpe, editor of *The Nation's Business*, addressed the convention, taking as his subject "Business is Business."

MR. THORPE'S ADDRESS

Mr. Thorpe's address was a plea for more constructive business methods as opposed to the complaints that we need more laws and legislative action. "There is too much tendency," he said, "to complain about conditions without doing anything to relieve them except to raise a clamor that 'there should be a law'." Mr. Thorpe gave credit to the different trade associations that were working for better conditions in their industries. He quoted the cynic's comments that "the trouble with representative government is that it truly represents." "Although this was spoken cynically," said Mr. Thorpe, "it was said truthfully that this weakness is its greatest strength."

"Log rolling in connection with public expenditure is no longer the popular force of Capitol Hill, nor do the drippings of the pork barrel now oil the gears of political machines as they once did," according to Mr. Thorpe. As he pointed out, in the old days isolated towns of not more than a thousand people were to be found with palatial public buildings erected at a cost of $60,000 or $70,000 and requiring an annual upkeep of from $4,000, $5,000 and $6,000, where, before, all the Federal functions could be performed in a rented post-office at an annual cost of about $300.00.

"There are to-day," said Mr. Thorpe, "approximately 200 special commission bureaus and semi-executive activities of the Federal government. Twenty years ago, there were fourteen. The cost of maintaining these agencies has mounted from approximately $1,000,000.00 to $650,000,000.00. In every case, these bureaus, boards and commissions were created by Congress in response to a direct and insistent pressure from noisy minorities within the national community."

He drew the conclusion from this that most of the criticism of Congress is for doing the very things we demand of it.

SPRING LABOR SURVEY

The session closed with the presentation of the result of the association's Spring Labor Survey. The survey gave the wages and condition in the steamfitting industry, existing in 156 cities in the United States on May 1, 1926.

The survey showed that the steamfitters' wages ranged from 70c an hour in Watertown, Wis., to $1.77 in Tampa, Fla., although an isolated case was reported from Brattleboro, Vt., where the wages ranged from 36c to 80c an hour. Some of the wages paid per hour in representative cities are as follows: Albany, N. Y., $1.37½; Atlantic City, $1.50; Boston, $1.25; Buffalo, $1.37½; Chicago, $1.50; Cincinnati, $1.50; Cleveland, $1.31¼; Detroit, $1.40, although there was a demand for $1.50 beginning May 1, 1926; Kansas City, $1.37½; Lexington, Ky., $1.00; Louisville, $1.37½; Miami, Fla., $1.75; Newark, N. J., $1.50; New York, $1.50; Philadelphia, $1.00 to $1.50; St. Louis, $1.50; San Francisco, $1.12½; Seattle, $1.25; Washington, $1.37½, and Wilmington, Del., 90c.

Committee on Standardization, in concluding his report, made the gratifying announcement that Engineering Standards, with The Standard Radiation Estimating Tables, has been adopted by the House-Heating Committee of the American Gas Association as the method to be followed in its gas house heating work.

The convention was one of the largest in the association's history, the registration exceeding 400.

Evening Session, June 2

The Wednesday evening session was held at the United States Chamber of Commerce Building where Elliot H. Goodwin, vice-president of the Chamber of Commerce of the United States, welcomed the delegates. Mr. Goodwin offered the use of the building for the association's next convention and stated that it was the headquarters for 1450 trade associations. The chamber, he added, has a department of manufacture and conducts researches in any industry upon request.

An important report presented at this session was that of the Boiler Output Committee, G. M. Getschow, chairman.

Report of Boiler Output Committee

George M. Getschow, Chairman, Boiler Output Committee

In presenting the report of the Boiler Output Committee, Chairman George M. Getschow first called attention to the previous work of the committee in interesting house-heating boiler manufacturers with a view to their adopting the Heating and Piping Contractors National Association's diagrams, formulae and standard form of output tests for heating boilers, as adopted by the previous convention.

"The work of the Boiler Output Committee," stated the report, "is in two divisions. The first is in interesting and securing the manufacturers to test their boilers in accordance with our standards and to furnish us with their output test charts. The second division of the committee's work is to prepare a correct code or formula, by which a proper boiler can be selected from the manufacturer's test chart."

The work of the committee during the past year, it was stated, has been directed principally to the second division in attempting to formulate a standard code or method of selecting the proper boiler for a complete heating installation from the boiler manufacturers' test charts as furnished by the committee. Mr. Getschow stated that the committee has met with considerable success in interesting manufacturers to test their boilers. He reported that forty-six house-heating boiler manufacturers received the charts and formulae. Of these, thirty-four have expressed themselves as favorable to test their boilers according to the formula and chart. Eighteen manufacturers have requested and received 1170 additional charts and five manufacturers have submitted eighty complete output charts. A number of manufacturers have tested many of their boilers, but have not as yet submitted their output charts to the committee.

"Some of them," stated Mr. Getschow, "have been rather reluctant in furnishing charts on a partial line of their boilers, while other manufacturers have not furnished them as they desired the committee to submit to their committee and themselves some standard method of selecting boilers from the output test chart.

"One who is not familiar with the Boiler Output Committee," stated Mr. Getschow, "can hardly appreciate the difficulties that have arisen in trying to work out this problem from a legal and technical, as well as a commercial, standpoint and which will be equally fair to the manufacturers, heating contractors and the consuming public.

"When one considers the number of manufacturers producing heating boilers and the number of styles, kinds and different assemblages made by them, the problem becomes a very difficult one to be solved. Your committee, therefore, is of the opinion that the progress made is a reasonable one, considering the labor and great expense which is attached to the manufacturer in testing and charting the output of his boilers."

Mr. Getschow told of the numerous meetings of the committee with the advisory committee of boiler manufacturers. "The two committees," he said, "have worked diligently and many schemes and ideas were submitted and discussed and when first prepared were thought quite reasonable and correct, but after careful study were found impractical and unworkable.

"During the many conferences with the manufacturers," he stated, "the

Convention Photograph of Heating and Piping Contractors National Association

committee was confronted with the question of boiler factors or boiler keys which have been adopted by many of the local associations in different cities, especially during the last two or three years. Some of the factors, it is claimed, are incurring a considerable hardship on some manufacturers and naturally, they are very much concerned with this question. The question, therefore, arises in the minds of the manufacturers if, when boiler output test charts are submitted to the committee and the formula for the selection of the proper boiler from the test chart is clearly understood and made workable and the complete information transmitted to the members of the association, the different factors or keying of boilers by the various locals in different cities will continue.

"It is the opinion of your committee and their recommendation," continued the report, "that the factor or keying method should, and will be, discontinued on all manufacturers' boilers on which test output charts are submitted and the method of proper selection is determined; that the catalog ratings on such boilers on which our standard test charts are submitted will be disregarded, and that the test output chart and method of selecting the proper boiler, as will be worked out by the Boiler Output Committee, will be used by our members."

It is the hope of the committee to successfully work out in some simplified form, the method of selecting the proper boiler and that this form can be applied for different localities and compiled in a way that will be easily understood by the members.

"In so doing," the report points out, "we must at all times keep in mind the progress and welfare of our industry, not alone for the heating contractor, but for the manufacturer and the consumer as well."

The report included a tentative formula for selecting the proper boiler from manufacturers' test output charts. This formula will be withheld from general publication until it has been adopted in final form. As soon as the formula is adopted, it is planned to continue the Boiler Output Committee with power to revise, from time to time if necessary, the formula or any part of the general specification chart, etc., which pertains to the output of heating boilers and the selection of a proper boiler from manufacturers' test output chart and for the further purpose of working out in some simplified form, the entire question for the use of the members.

Nathan D. Williams, associate council for the National Association of Manufacturers, addressed the convention on "Legal Aspect of Certified Heating."

Legal Aspect of Certified Heating

In introducing his subject, Judge Williams referred to the fact that the primary group of associations have many points of contact, but no conflicts. These he listed as:

1. Local associations of employers.
2. The trade associations of particular industries.
3. State associations of manufacturers.
4. A national association of manufacturers.

He described the function and field of a trade association as being concerned with the common problems of the particular industry in which the particular business unit is engaged and from which those conducting such activity derive their income.

"Certified heating," he stated, "has been defined by a distinguished member of the heating group as follows:

" 'Certified heating is a guaranty by a group of responsible people, or a surety company, or a bonded group, that the work installed by an individual is proper and adequate for the performance for which it is intended, and the individual, subscribing to the purposes and objects of this group, binds himself to follow the formulae and quantities laid down by the collective membership.'

"This definition presupposes a group of 'responsible people.' This supposition I take it is met both in your local groups and in your national association as a whole. It likewise contemplates 'formulae and quantities' established by 'collective membership' for an adequate, worthwhile, useful and complete heating job expected to meet the demands and fulfill the reasonable requirements of your customer—the ultimate consumer—who maintains you and your organization for expert and competent service to him in his heating needs and requirements.

" 'Collective membership' is, of course, met by your association and through your association I understand that you have worked out heating 'formulae and quantities,' and have adjusted them and are adjusting them to the heating needs of your customers in different sections and communities of our common country.

" 'Certified heating' thus becomes first an advertising problem in that if it is to be of advantage to your members, and be of use and service to your customers, they must receive knowledge and information concerning what your local and national associations do with respect to the subject of heating and how that rebounds to the welfare and satisfaction in your customer.

"In advertising campaigns to be useful and valuable it is of course vital either to advertise the names of the individual members of the association, which is often impracticable, or to identify the members or their products by an association trade-mark or insignia. The most valuable of this character of trademark or insignia identification is that which combines simplicity with distinctiveness.

"You have in the phrase 'certified heating' an interesting and suggestive idea, and if I may make a suggestion to those more experienced than myself, I would propose that you develop for this work a uniform plate to be attached to each particular job wherein the name of the national association is prominently displayed, as well as the name of the local association, and each such plate carrying a number which will identify the production of the individual member installing the job. Thus you will tie in the work of the national association in developing standards and formulae of heating requirements, quantities, etc.; you will identify the local association, and by a number you will identify the individual contractor who is primarily responsible for the success of the job. This idea seems to have been developed, at least partially, by some of your associations, though apparently with considerable variations, as I observe from information which has been laid before me. By adopting such a uniform trade-mark it could probably be registered in the name of the association, either general or local, be issued by such association to its members as required, and its use thus thereby be legitimately and properly controlled. Such insignia thus becomes an integral part of the joint advertising, whether newspaper, magazine, circular or booklet, in which the associations attempted to popularize and develop goodwill by informing the public of the character, capacity and competence of its members to supply the most expert service in the installation of heating requirements.

"In developing and carrying on a campaign for certified heating as a joint activity of either the national or local group there arises the problem of how to apportion or adjust the expense of such advertising. This may perhaps be most adequately and fairly adjusted by basing the appropriations for such a campaign on the fixed percentage of the output of each member, say for the past year, and then readjusting such account twice a year upon the basis of actual contracts for such year. In this way the group, whether national or local, would get its funds in advance to meet its bills and expenses promptly, and through the readjustment all members would be placed on the same footing as they would have been if the assessments were paid after actual completion of contracts."

President Merrill invited a discussion on certified heating, which has been spreading so rapidly throughout the country. A number of members from smaller cities requested more detailed information as to how to go about the adoption of certified heating in their community.

As a result of the discussion, it was decided to appoint a temporary committee, composed of members from cities which had already adopted certified heating, to meet with the other members and give them the desired information.

This committee was made up of William D. Emory, Brooklyn; N. W. Lunda, Memphis, Tenn.; Herbert A. Snow,

Boston; M. G. Sellers, Philadelphia; Louis Braun, Chicago; L. Walter Moon, St. Louis; A. R. Herske, Cleveland, and T. G. Lohman, Los Angeles.

The consensus of opinion, as expressed by the speakers, was that certified heating raises the standard of workmanship and material and eliminates the incompetent contractors.

William Anderson, of Philadelphia, stated that his firm had done $200,000 worth of oil burner business during 1925. He expressed the opinion that it presents a profitable field for the heating contractor.

D. Knickerbacker Boyd, a prominent architect of Philadelphia, spoke on sizes of flues and heights of chimneys as important factors in adequate heating systems. He urgently recommended for action by the association that the mason contractors, who erect the chimneys, be not paid until the chimneys are certified as tight. Ultimately, he stated, we will have chimneys inspected and certified by the National Board of Fire Underwriters. In this connection, he called attention to the National Chimney Code published by the Underwriters.

Mr. Hertz, of the Chicago Master Steamfitters' Association, presented the advertising features of certified heating. This literature, he said, has been sent to architects and owners in the business zone of Chicago by the Chicago association. He also stated that the Illinois Architects' Handbook mentioned certified heating.

George W. Norris, governor of the Federal Reserve Bank of Philadelphia, also addressed the convention on "Installment Selling, Its Uses and Abuses." Mr. Norris took the position that there was a great deal to be said for and against this method of selling.

He called attention to the recent enormous growth of installment selling, stating that almost 75% of the automobiles are sold in this way. The buying power of the nation, he said, had increased enormously during the past five years as a result of the installment plan, as it had removed the buying barrier for the working man or the man in ordinary circumstances. The usual terms, he said, are one-third down and the balance in ten monthly installments. He cited the fact that installment selling has resulted in the establishment of about 1400 commercial credit companies who handle the financing of installment sales for the manufacturers.

"Installment selling," continued Mr. Norris, "presents small risk for the manufacturer in good times. If a serious business depression should come along, losses would be widely distributed, therefore, there would be no great danger of a crash."

He illustrated the operation of installment selling in this way: $6,500,000,000 worth of goods were sold in 1925 to people who had only $2,500,000,000. This resulted in $4,000,000,000 of goods sold in 1925 that would not otherwise have been sold that year. This is called by economists "consumers' inventory."

"The real and most vital question," concluded Mr. Norris, "is the sociological effect of the practice. The American-born citizen is not thrifty like the citizen of foreign birth. He wants to 'keep up with the Joneses.' As a result, the largest part of installment buying is for goods that add to the overhead of the household and comprise such items as automobiles, radios and victrolas."

Morning Session, June 3

During the Thursday morning session, President Merrill invited John Coefield, president of the United Association of Plumbers and Steamfitters of the United States and Canada, to the platform. Mr. Coefield advocated close relationship between his organization and the Heating and Piping Contractors National Association. He invited the members to attend the journeymen's convention and listen in on their conferences.

"We have no secrets to hold from you," he stated. "We extend the olive branch to you to meet with us and discuss matters of mutual interest. The old system of strife does not pay. This is a period of organization, and the process of conciliation is better than the old method of mutual antagonisms."

Report of Board of Directors

The report of the board of directors was presented by Harry M. Hart, chairman. Of the subjects considered by the board during the previous year, Mr. Hart placed first the continued activity to counteract the persistent efforts of the organized steamfitters to do away with the steamfitters' helper. Guided by the experience of those who have had that unfortunate condition forced upon them, as well as by the wisdom of those who could always see the undesirability of it, the board, he stated, has overlooked no opportunity to try to discourage the union from carrying this movement any further.

"Just because a helper is given a fitter's card and a fitter's wages," declared the report, "does not make him any more valuable to the employer, and the fitter who is willing to go out and install a heating system in even the smallest type of dwelling without help, is indeed a rare individual."

Mr. Hart referred to the appointment of Robert H. Bunten, as assistant to the secretary, and of the appointment of Mr. Fitts as associate editor of the *Official Bulletin*. Mr. Fitts, he stated, will devote all of his time to the *Official Bulletin* that is not taken up with the work of the Committee on Standardization.

ELIMINATION OF STEAM-TYPE RADIATOR

The question of the elimination of the steam type of cast-iron radiator was discussed in the report, with a reference to the action taken at the last annual convention, when the matter was referred to the incoming board. The report told of the test conducted in the Research Laboratory of the American Society of Heating and Ventilating Engineers and of the favorable results secured, which have led many manufacturers to discontinue the manufacture of steam-type radiators.

"Your board," stated the report, "recommends that this association go on record as being in favor of the elimination of the so-called steam-type radiator."

The report also referred to the question of cleaning and painting radiators at the factory, which has been the subject of much discussion and correspondence. As yet, it was stated, no definite action has been taken, owing to the objection of some of the large manufacturers to entering into an agreement of this kind.

CUTTING OF CHASES AND CHANNELS IN BRICK, TILE AND OTHER MASONRY

The question of cutting of chases, it was stated, was again brought up before the National Board of Jurisdictional Awards by the masons and the association was represented at this meeting which resulted in the following action:

"Inasmuch as no other trades except the bricklayers, plumbers, steam fitters, and electricians have claimed this work, it is decided that the cutting of chases and channels in brick, tile and other masonry is the work of the bricklayers, except that the plumbers and steam fitters and electricians shall have jurisdiction to do cutting where required for the installation of their respective work."

High praise was given in the report to the work of the Committee on Standardization. Reference was made to the agreement with THE HEATING AND VENTILATING MAGAZINE, whereby the magazine is publishing the Standard Radiation Estimating Tables, in return for which the magazine has given space in which to advertise the association's standards. "This," stated the report, "has resulted in an increased sale of our book, 'Engineering Standards.'

"The board feels that the more generally these standards are used, the greater standing they will have and the sooner we will find our mistakes, if any have been made. It was with this end in view that manufacturers were given permission to publish some of these standards in their catalog."

The board expressed its indebtedness to the chairman of the committee on Standardization, Walter L. Fleisher, "for the many long, weary hours he has devoted to this work."

CO-OPERATION WITH THE NATIONAL TRADE EXTENSION BUREAU

The report referred to the special appropriation of $3000 made by the American Radiator Company to the National Trade Extension Bureau. After conferring with the association, the company designated this fund to be used toward the expense of editing and publishing a text-book for the learners in the steam-

fitting class. The board expressed its appreciation of the generous support of this movement given by the American Radiator Company.

The report commented on the use of radio by members for broadcasting information on heating subjects and stated that arrangements had been made in Chicago to have talks by members of the Chicago Master Steamfitters' Association broadcasted at regular intervals.

An appropriation of $500.00, it was stated, had been made to the A.S.H. & V.E. Research Laboratory and special attention was called to the five subjects now under investigation at the laboratory. This program, it was stated, is perhaps due, to a great extent, to the guiding hand of Vice-President William H. Driscoll, who is president of the American Society of Ventilating Engineers. These five subjects are as follows:

1. Critical velocities of steam in pipe, with particular reference to critical velocities of steam in up-feed risers on single-pipe steam systems.
2. Infiltration, commonly designated as air changes in a building due to leakage.
3. The radiator design in its relation to heating effect at the breathing zone.
4. Heat loss constants in building construction, both old and new.
5. Air conditioning.

The Boiler Output Committee, stated the report, has had numerous meetings with the manufacturers. (The report of this committee was presented at a previous session). The association, continued the report, is greatly indebted to the chairman of that committee, George M. Getschow, for his untiring and persistent efforts to bring the work of the committee to a definite conclusion, and the result of his work will be one of the most outstanding achievements of this association.

Certified heating, it was stated, is continuing to gain in popularity. Reference was made to the booth maintained by the Chicago Master Steamfitters at the recent Own-Your-Home Exposition in Chicago, where certified heating was explained to the public and a talk on certified heating was broadcasted by radio.

Secretary's Report

Secretary Henry B. Gombers mentioned particularly the increase in membership which, he stated, indicates a healthy growth, rather than a spasmodic attempt to add members to the roll. He showed that the greater part of this growth was made in cities where local associations now have certified heating in operation or under consideration, with the intention of perfecting the needs and methods of presenting it to the public at large.

On the subject of trade ethics, Secretary Gombers stated that grievances or complaints of the practice of manufacturers selling goods to others than those who are considered in the trade, are rarely brought to the association's attention nowadays, and he stated that the association is appreciative of the situation that exists by reason of the attitude of the manufacturers on this matter.

"Is it not a fact," he asked, "that most failures in our industry are of those who are notorious price-cutters?

"Will the records not show that manufacturers lose most money through the failure of contractors who are continually taking work at cut-throat prices up to the time that the sheriff comes around?

"Would the manufacturers not save much money, to say nothing of annoyances, if they would see to it that their goods were not resold at prices so low as to be harmful to the industry at large? In other words, not to be used as 'sprats to catch mackerel'?"

"There is no question at all," stated Secretary Gombers, "as to the right of a manufacturer to refuse to sell his goods to anyone he does not desire to sell to. That fact was established by the decision handed down in the Colgate case by the Supreme Court of the United States.

"It is equally true," he stated, "that there is no question as to the right of a contractor, who in this case is really a retailer, to stop dealing with a manufacturer or a jobber" and he quoted the Colgate decision on this point to the effect that "a retailer has the unquestioned right to stop dealing with a wholesaler for reasons sufficient to himself any may do so because he thinks such dealer is acting unfairly in trying to undermine his trade."

On the subject of standardization, Secretary Gombers stated that from the standpoint of use, the figuring of radiation by the standard methods of the association is to-day firmly established. In the same way through use, the standing roughing-in dimensions of radiator supply valves and modulating supply valves and return-line traps have been established.

He also referred to the contribution of the association to the program of simplification in the elimination of the steam-type radiator, which was begun at the last convention.

BOILER SITUATION

On the work of the Boiler Output Committee, Secretary Gombers said: "Probably the most chaotic condition in the heating trade was the rating of boilers in which the manufacturer of cast-iron or steel boilers rated his boilers by his own methods and, it sometimes seemed, according to his own whim. Our Boiler Output Committee, under the able leadership of our past president, George M. Getschow, has been able to bring about the adoption of a standard method of testing boilers and we believe that the condition that existed for years past will yield to the co-operative efforts of this committee and the boiler and radiator manufacturers, who are co-operating with it."

Local associations which have adopted certified heating during the past year include Boston, Cleveland and Philadelphia, while other locals which are making progress in its adoption are Buffalo and Denver. Individual contractors who have the matter under consideration include those in Louisville, Richmond, Va., Seattle and Portland, Ore.

The demand for copies of Engineering Standards has been such, it was stated, as to make it necessary to print additional copies, which are now available. Copies of Engineering Standards have gone to many places outside of the United States, such as Canada, England, France, Belgium and, quite recently, Japan.

"One continuous campaign we carry on," stated Secretary Gombers, in concluding his report, "is to have the heating contractor and the heating industry properly placed. There was a tendency to refer to them in such a way as to indicate combination industries. We have been successful in securing the co-operation of many magazines and advertisers in recognizing the fact that heating is a separate industry and should in fact be referred to as such. The National Trade Extension Bureau agrees with us in this."

Report of Committee on Standardization

Walter L. Fleisher,
Chairman, Committee on Standardization

In presenting the report of the Committee on Standardization, Walter L. Fleisher, chairman, stated that this year has been a year of achievement and of recognition. "Some of the sowing," he declared, "that we have done for the last six years has brought in a fairly bumper crop and now men are realizing the value of the work that this committee has accomplished in the past year.

"I am hopeful," he added, "that the success of certified heating or guaranteed heating, or whatever name standardization of modern requirements may go by, will be so firmly established by the time any lean period comes that its momentum will carry it over a period of depression that may follow the high era of maximum building and remodeling.

"The actual investigation work carried on by the committee," stated Mr. Fleisher, "has been in the development of factors for additional cities, checking up our previous calculations and in such minor instances modifying these, together with a general study of the question of pipe sizes for steam and hot water. The additional cities for which exposure factors have been developed are Providence, Cincinnati and New Orleans.

"Gradually," he stated, "the records are covering the entire country and the members of the committee are so accustomed to work out these exposure factors that any section of the country

actually requiring records for its own locality can have these records worked out by the Committee on Standardization, if they will get for the committee sufficient readings covering a definite period of time.

"Another item of importance," he stated, "is the new conversion table giving the factors for use when room temperatures other than 70° F. are desired. In this new table, these temperatures, rather than outside temperatures, are used.

"New and accurate calculations on transmission losses, somewhat different from those we have used in our calculations for radiation, required your committee to make a resurvey of the transmission factors which we had published in 'Engineering Standards' and which were used in the development of the Standard Estimating Radiation Tables. We found that our records were so nearly accurate that the difference in the total radiation required, even under the greatest discrepancy, was negligible and in no way would change the installation of the heating system.

"From experience in a great number of buildings," continued the report, "we determined to suggest a slight change in the exposure factors where three or more exposures and exceptionally good construction existed and in the light of these experiences, to permit a reduction not to exceed 25% of the total lineal feet of crack in the infiltration loss factor. We believe this is one of the main criticisms that existed in connection with our radiation sheets and that the investigation of this matter and the reduction in infiltration loss has now satisfactorily been taken care of."

The report stated that the hostility to the committee's work on the ground that it was a technical committee of a practical contractors' association has, to a great extent, died down and the work it has done is now receiving recognition, not only from the public in general, but from the engineering societies who have become acquainted with it.

In its work this year, stated the report, in an effort to determine pipe sizes necessary for the proper distribution of steam and water in a heating system, so many discrepancies were found in the rules of the engineering societies that a request was made of the A.S.H. & V.E. Research Laboratory to make additional research in connection with the flow of steam and water, in order that the matter should be thoroughly and scientifically investigated before presenting the committee's findings.

"The year," continued the report, "has seen a great deal of publicity given to the work that your association has done in this matter. THE HEATING AND VENTILATING MAGAZINE, as you probably know, with the permission of your Board of Directors and with the thorough approval of your Committee on Standardization, has been publishing most of the matter contained in your 'Engineering Standards' and has been offering advertising matter to us with the object of procuring additional sales for our standards and our radiation sheets. The result has been so successful that it has been necessary to reprint our 'Engineering Standards,' which has now been done.

"At least one, and probably more, of the boiler and radiator manufacturers who issue handbooks, have requested permission to publish parts of the matter from our 'Engineering Standards' and although this will probably decrease the sale of 'Engineering Standards,' it will give such wide publicity to the work that we have done that we think it is of great value to allow this procedure."

In concluding his report, Mr. Fleisher emphasized the importance of action on the part of all local associations to respect the association's standards.

After referring to the successful efforts resulting in the elimination of the steam-type radiator, Mr. Fleisher spoke of the suggestion which he made to the Department of Commerce that standardization of window crack would be a step of immense value in the elimination of wasteful heating; that a great many of the factors of safety required in the design of heating systems were due to the uncertainty of the width of the crack in window construction, allowing more or less infiltration. "We have promises from the Department of Commerce," he stated, "that this matter will be taken up with the American Institute of Architects, with the idea of coming to some general conclusion."

Finally, on the suggestion that manufacturers and users eliminate certain sizes of steam pipes, the report stated that this matter had been brought to the attention of the committee in complete form by the Department of Commerce, working with the Manufacturers' Standardization Society. These organizations suggested the elimination of the following sizes, both in standard weight, extra-heavy and double extra-heavy: 4½ in., 7 in., 9 in., 11 in. and 15 in., 17 in., 19 in. and 22 in. O.D. On this point, the report stated "Your committee has given serious consideration to this matter and recommends without question the elimination of all these sizes, with the exception of the 4½ in., of which they thought it possible that a considerable amount might be used by the heating profession. However, on careful investigation, we have determined that the recommendation of the Department of Commerce, acting in conjunction with the manufacturers, was a wise one and we have suggested your co-operation in the above elimination. This matter has been placed before the Board of Directors, who have concurred in the opinion of your Committee on Standardization. We are informed by the Department of Commerce that the actual discarding of these sizes will not become effective for at least one year, but we are putting the matter before you at this time for your observation and comment.

AMERICAN GAS ASSOCIATION ADOPTS STANDARD RADIATION ESTIMATING TABLES

"The American Gas Association," concluded the report, "through its House Heating Committee, during the past three months has been in communication with members of your Committee on Standardization and with your secretary's office with the idea of having your co-operation in the determining of proper factors and methods for figuring radiation to be used by the American Gas Association and the public utilities companies interested in the heating of houses through gas-fired boilers. I am sure that you will be gratified to realize that after conference with their committees last week the unanimous approval of the standards developed and adopted by your Committee on Standardization, and now in rather general use by your association as a whole, were approved and recommended by the House Heating Committee of the American Gas Association.

"The American Engineering Standards Committee, on the various committees of which association we are acting as sponsors, has suggested several changes which may be of interest to us in connection with flanged fittings and flanges and as your association members were pioneers in the standardization of cast-iron valves, fittings and flanges, of course we are taking an active interest in this matter, in order to safeguard your interests."

Morning Session, June 4

Officers elected at the final session Friday morning are as follows: President, Harry M. Hart, Chicago; vice-president, William H. Driscoll, Long Island City, N. Y.; treasurer, Horace W. Jones, Rochester, N. Y.; secretary, Henry B. Gombers, New York. Board of directors: Walter Klie, chairman, Cleveland; William M. Anderson, Philadelphia; William H. Driscoll, Long Island City; Harry M. Hart, Chicago; Frank W. Howard, Boston; Horace W. Jones, Rochester, N. Y.; John S. Jung, Milwaukee, Wis.; R. Templeton Smith, Pittsburgh; R. L. Spitzley, Detroit.

RESOLUTIONS

Among the important resolutions adopted at this session were the following:

That the Boiler Committee should inform the members of the manner of obtaining information by publishing same and sending a copy to all members.

That the association favor the standardized size for catalogs of manufacturers and jobbers.

That the builders of chimneys be required to O.K. their chimneys, giving the size, height and construction, also demanding a smoke test as a final O.K.

That the association favor doing away with the steam-type of direct radiator.

Before the convention adjourned, a proposal was made to elect as an honorary member, Samuel I. Pope, of Chicago, the oldest past-president of the association. The vote was unanimous and the honor was accepted by Mr. Pope in a gracious speech, thanking the members for their thoughtfulness.

Oil Burners in Heating Specifications

By George Cormack

At first glance, in specifications for the heating system of a building where oil is the fuel specified, it would seem that the oil burner should be included as part of the heating specifications. However, there are conditions under which, in many cases, such a method might work a hardship on both the heating contractor and the owner of the building.

If the successful bidder on the heating contract is a resident of the city where the building is located and is the agent for an oil burner that conforms to the architect's specifications, there will be no trouble for him or the owners of the building.

There will be, however, a hardship worked on bidders from outside the city, because they will have either to accept resident oil burner agents' figures on oil burners or put in a burner that is not handled in that city. It is often the case that the only oil burner handled in a city that conforms to the specifications is sold by a heating man who is also bidding on the entire heating job.

It is increasingly hard to sell an oil burner in any city or locality where there is no responsible agent handling the burner. The general public is becoming more and more conversant with the fact that skilled and instantly available service is almost a necessity in the efficient and reliable operation of an oil burner. Yes, I know the high-pressure oil-burner salesman does not tell you that, but it is true, nevertheless.

It is also true that, in many cases, service is seldom or never required, but the customer who has purchased and installed an oil burner in his building feels a great deal more confident and secure if he knows that he can have some one on the job in a few minutes' time should his burner cease to function as it should.

When the question "How about service on the oil burner?" is put to the bidder on the heating contract who is figuring on an oil burner not handled in the city where the building is located, any answer the bidder can make will not tend towards a more favorable attitude to his bid on the entire job.

On the other hand, suppose the outside bidder goes to the local man who handles a suitable oil burner for the job, and who is also bidding on the whole heating contract; the price quoted on the oil burner by the local man to the outside bidder can easily be high enough to throw the outside bidder's figures on the entire job out of the running.

It is but fair and right, however, that the local man having to service the burner should install it or personally supervise the installation.

There is a great deal more to burning oil for heating and other purposes than sticking a few fuel nozzles into the firebox of a boiler and letting it go at that. The man experienced in oil burning can often effect great fuel savings by making very slight changes; and the success of oil burning, especially in the larger heating units, depends almost entirely on the savings that can be effected.

The time will come when a knowledge of oil burners will become general and part of every heating man's mental equipment; but until that time arrives it would seem better and fairer to all concerned that specifications and contracts for heating and oil burners should be separated.

Committee Appointments of American Oil Burner Association

Recent committee appointments announced by the American Oil Burner Association are:

Executive Committee—Lionel L. Jacobs; Leod D. Becker, executive secretary, and C. H. Chalmers.

Committee on Simplification of Standardization—Edw. M. Fleischmann, Baltimore; C. H. Rittenhouse, New York; J. N. White, New York; E. M. Ford, Racine; M. S. Ray, San Francisco; B. F. Geyer, Fort Wayne; G. P. Gregory, Pittsfield, Mass.; J. H. Haberly, Fort Wayne; John Scheminger, Jr., Providence; G. S. Meikle, Detroit; John F. Straitz, Philadelphia; H. W. Sweatt, Minneapolis; C. E. Fletcher, Newark, and L. J. Hicks, Detroit.

Committee on Technical Research—J. L. Breese, Chicago; John P. Leask, New York; Games Slayter, Lafayette, Ind.; Han A. Kunitz, and C. F. Olmstead, technologist, New York.

Committee on Business Standards and Codes—M. E. Simpson, H. W. Sweatt, Chas. Sigwald, C. H. Chalmers and Earl Marr, all of Minneapolis.

Committee on Convention Papers—J. P. Leask, Geo. P. Kittel and C. F. Olmstead.

Committee on Co-operation With Heating Industry—Homer Linn and R. W. Barry of Chicago; W. L. Huff, Wabash, Ind., and S. Doutch, Detroit.

Committee on Oil Fuel—O. P. Keeney; Leod D. Becker, executive secretary, and H. D. Frueauff, all of New York.

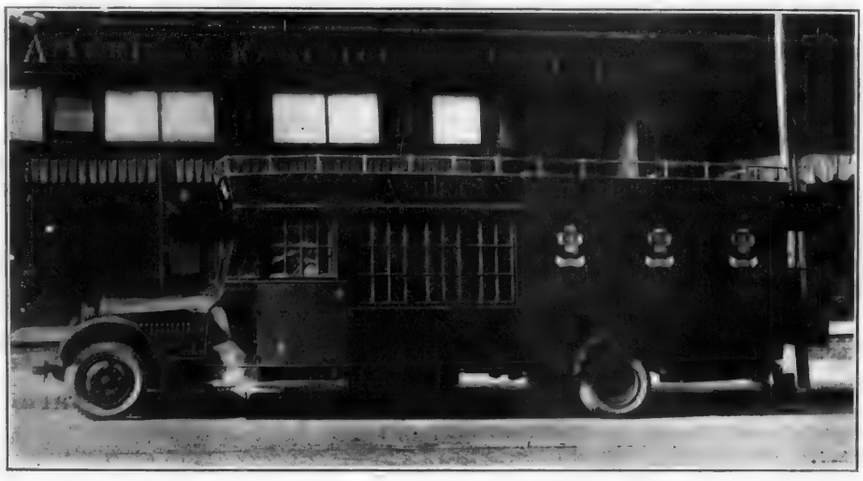
Committee on Patents—W. H. Koken, St. Louis; J. L. L. McCormick and J. H. Hirsch, Chicago; Powel Crosley, Jr., Cincinnati; H. Finnie, Detroit; D. A. Burke, Chicago; Walter F. Tant, Detroit; Edwin M. Fleischmann, Baltimore; W. A. Rosenfield, Rock Island, Ill.; J. E. Martin, Peoria, Ill.; Edw. P. Bailey, Philadelphia, and C. J. Sherwood of Los Angeles.

The next quarterly meeting of the board of directors of the association will be held during the month of July, at Toronto, Ont., Canada. At this meeting next year's convention city will be selected.

Demonstration Cars of Heating Equipment

One of the developments of the day is the use of traveling demonstration outfits by which manufactured products and their use may be brought directly to the attention of the consumer. While railroad cars have been used to a large extent for this purpose, the availability of the automobile and its ability to go directly to the places where the public can easily congregate, rather than have the public come to the demonstration, has given the motor car a decided advantage in this respect.

A typical motor car demonstration outfit is that of the American Radiator Company, which contains typical setups of the company's products, showing their application and usefulness.



Traveling Demonstration Car of American Radiator Company

Death of S. Homer Woodbridge

PROFESSOR S. Homer Woodbridge, who long held a dominating position in the heating and ventilating profession, especially in its earlier years, died June 4, at the home of his son, Dr. Philip Dudley Woodbridge, in Portland, Conn. Professor Woodbridge for sometime had been in failing health. His most important recent work was the design of the heating and ventilating equipment for the National Cathedral of SS. Peter and Paul in Washington, now under construction.

Professor Woodbridge was seventy-seven years old. Long before the present generation of heating men became active in the industry, Professor Woodbridge had established a reputation as professor of heating and ventilation at the Massachusetts Institute of Technology. In his capacity as engineer, Professor Woodbridge had been prominently identified with the heating and ventilation of the United States Capitol in Washington, the Congressional Building and the new National Museum Building.

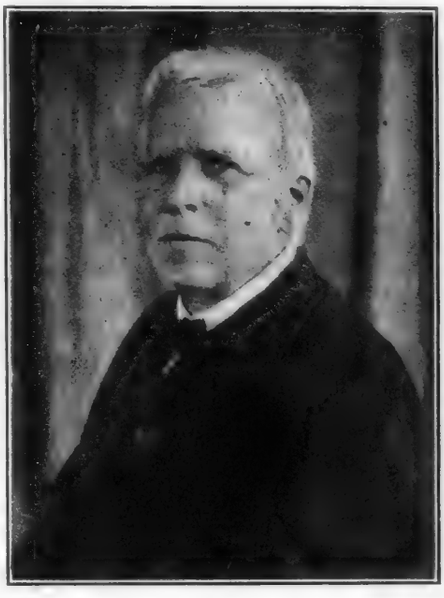
In 1905, he made a valuable report to Congress on the economic value of a central plant for power, lighting and heating for the Federal executive buildings in Washington. During the following two years, he reported on the sanitary condition of school houses in Boston, New York, Philadelphia, Portland and Auburn, Me., Portsmouth and Concord, N. H. He served on the expert commission of the New York Courthouse in 1913 and 1914. A sidelight on the character of Professor Woodbridge is shown in the fact that he acted as organizer and director of the three-year national campaign, which resulted in the overthrow of the Louisiana Lottery after its removal to Tampa and Honduras.

An extended account of Professor Woodbridge's career, prepared under his immediate direction, appeared in THE HEATING AND VENTILATING MAGAZINE for February, 1924. In this article, he told in the following words the story of the way he became connected with the heating and ventilating industry:

"While attending the Massachusetts Institute of Technology as a student in the department of physics, intending to prepare himself as an instructor, Professor Woodbridge, then a young man, became practically interested in matters of ventilation because of the atmospheric conditions existing in the crowded class and lecture rooms at the institute.

"Through his efforts and under his supervision, such simple, inexpensive and effective means for ventilation were provided for the relief of many of those rooms that when the large lecture laboratory and classrooms in the Walker Building were planned, he was directed by the Corporation Building Committee to prepare plans for its ventilation. Frederick Tudor was retained at his solicitation as an associate in a consulting and contracting capacity on the side of heating.

"When the proposed scheme was submitted to a couple of the leading firms in the steam heating trade in Boston, for an opinion as to the practicability of the plan, the trend of advice was to the effect that the installation of such a plant would cost a mint of money and that its operation would require a mine of coal. The advice of Harvard University, after a disappointing experience in Sever Hall, was emphatically adverse to an adoption of the plan. The committee, however, backed its own student product, with the result that the building equipment and the performance of its system in both efficiency and economy became widely and favorably known, both at home and abroad."



The Late Prof. S. Homer Woodbridge
Long a Leading Figure in the Heating and Ventilating Field, Who Died June 4.

Following that result, Professor Woodbridge was selected by the corporation to devote his entire time to the work of transforming the then capricious art and rule-of-thumb practice of heating and ventilation into an established science. He became the first appointed instructor specialist in that department in American technical schools.

USE OF UNUSUAL EXPEDIENT IN VENTILATING WORK

For the purpose of supplying and using the largest permissible qantity of air without draft, in special cases, resort has been made by Professor Woodbridge to expedients not commonly found in ventilating work, such as utilizing the legs of chairs in theatres, lectures and music halls, where seats are permanent and fixed; the desks and floor riser in legislative halls; and pew bodies and construction in churches. In one installation, for instance, which he designed for the New York Courthouse, the arrangement provided for a supply of air at the rate of 200 cu. ft. per minute per capita to the judges of the bench, while in the case of the equipment for the United States Supreme Court, the air is supplied through 6 to 8 sq. ft. of outside and porous covering of the several chairs, the quantity of flow being individually controlled by each chair occupant by an electrically-operated damper, and the temperature of the supplied air being similarly governed by an electric and personally-controlled heater.

DEVELOPMENT OF THE FIXED ORIFICE PRINCIPLE

The last announced innovation of Professor Woodbridge in the engineering field is that set forth in the columns of THE HEATING AND VENTILATING MAGAZINE for January and March, 1921, namely, in the application of the principle of the fixed orifice, together with variable steam pressures in steam mains for controlling, both with certainty and ease, the distribution and regulation of steam flow to few or as many radiators or convectors making up a heating system.

In this method the steam pressure is made to vary in the mains according to the heating requirements, the pressure being controlled either by the regulated intensity of the boiler fires or by a single reducing valve. Professor Woodbridge claimed for this method that it eliminates the necessity of both air and condensation trap valves and also the use and manipulation of as many and as scattered steam valves as there are radiators and convectors.

The advantages sought through this arrangement were: first, uniformity of steam distribution through the system, whatever the amount of steam required by the several radiators or convectors which constitute the system and, therefore, the complete control of temperature through heat yield by that system; second, the reduction to a minimum of valve manipulation, the steam quantity used being accurately controllable by a single valve and made exactly equal to the heating requirements and that without waste.

Under plans and specifications prepared by Professor Woodbridge, the method above outlined is to be given an extensive and crucial demonstration in the near future, in connection with the Washington Cathedral. In this installation steam is to be supplied to some eighty-five radiators, mostly of large size, ranged along nearly one-fourth of a mile of steam piping and scattered over an area of some 45,000 sq. ft. All the radiators are to be steam-fed by the manipulation of a single valve and the steam supplied to every individual radiator controlled by a fixed orifice and the steam pressure behind it.

Government Starts Movement to Reduce Variety in Types of Radiators

REPRESENTATIVES of approximately 90% of the production of radiators of the country, meeting under the auspices of the Division of Simplified Practice at the Department of Commerce, June 17, set in motion steps for the reduction of variety in this item of heating equipment; and adopted a motion requesting the National Boiler and Radiator Manufacturers' Association to conduct a survey of the existing variety.

The meeting was presided over by Edwin W. Ely, assistant director of the Committee on Metals Utilization, and in addition to the manufacturers there was present Henry B. Gombers, secretary of the Heating and Piping Contractors National Association, whose organization has been active in standardization in the heating and piping field.

Discussions indicated that the existing variety was affected by the demands of architects and consulting engineers, and was complicated by the height of windows, type of building construction, etc. It was shown that the radiator industry has achieved a degree of simplification by abandonment of the steam type of radiator. Mr. Gombers reported that his association is strongly in favor of further simplification in the hope of reducing costs of installations and maintenance and of providing greater adequacy of installations.

Representatives of some of the companies reported that there are items which contribute as little as 3/10th of 1% of their total demand, while as much as 75% of their business comes from five or less sizes. The radiator industry, it was shown, has experienced a marked change in the demand from an artistic standpoint in the last twenty years, the old-time highly-ornamented types being supplanted by the more simple designs of the present.

Development of a new type of radiation, it was reported, is a problem which holds possibilities of so complicating the variety of sizes as to make conditions "chaotic." It was also stated that the American Society of Heating and Ventilating Engineers is making studies looking to uniformity in methods of rating radiators of various types and sizes.

From the results of the survey which was requested, it is expected that a tentative Simplified Practice Recommendation will be prepared to be submitted at a later date to a general conference of makers, engineers, architects, heating and piping contractors, building owners and managers, construction companies and others, for action.

Those present at the meeting included the following:

Sherwood C. Bliss, Richmond Radiator Co., New York; R. C. Bolsinger, Fowler & Wolfe Manufacturing Co., Philadelphia, Pa.; George C. Boose, Gurney Heater Mfg. Co., Boston, Mass. John S. Burke, Logansport Radiator and Equipment Co., Logansport, Ind.; Thos. F. Burke, U. S. Radiator Corp., 410 Bond Bldg., Washington, D. C.; W. B. Gifford, Jr., American Radiator Co., 4th and Channing St., Washington, D. C.; Henry B. Gombers, Secretary, Heating and Piping Contractors National Association, 50 Union Square, New York; Chas. W. Good, Union Radiator Co., Johnstown, Pa.; Chas. P. Hackett, U. S. Radiator Corp., Philadelphia, Pa.; J. Walter Jacob, National Radiator Company, 2205 5th St., N.E., Washington, D. C.; H. E. Longwell, Pierce Butler & Pierce Mfg. Corp., 41 E. 42nd St., New York; M. F. Moore, Kewanee Boiler Co., Kewanee, Ill.; W. C. Murray, Lincoln Radiator Corp., Utica, N. Y.; J. J. Smith, Republic Boiler & Radiator Co., 1214 New York Ave., Washington, D. C.; Geo. N. Thompson, Building Code Committee, Department of Commerce, Washington, D. C.; W. W. Wetmore, Niagara Radiator & Boiler Co., Buffalo, N. Y.

Those representing the Division of Simplified Practice were: Edwin W. Ely, assistant director, committee on Metals Utilization; P. H. H. Dunn, E. L. Priest, and J. S. Crews.

Comparative Data on Coal, Gas and Oil

A comparison of fuel-oil, coal and gas, which appears in *Fuel Oil* for June, presents interesting data:

The heat required to evaporate 1 lb. of water from and at 212° F. into steam at 212° is 970.4 B.T.U. As a boiler horse power is the evaporization of 34½ lbs. of water from and at 212°, it follows that a boiler horse power in B.T.U. is 33,479. If 100% efficiency was obtainable, then 33,479 B.T.U. would develop a boiler horse power. However, this is not possible and the following table gives the amounts of fuel oil of 18,500 B.T.U. per pound; coal at 13,500 per pound and natural gas at 1000 B.T.U. per pound that are required at efficiencies noted.

Efficiency per cent	B.T.U. per B.H.P.	Fuel oil lbs.	Coal lbs.	Natural gas cu. ft.
100	33,479	1.80	2.48	33½
90	37,200	2.00	2.75	37
85	39,387	2.12	2.91	39½
80	41,848	2.25	3.10	42
75	44,638	2.40	3.30	44
70	47,872	2.57	3.54	48
65	51,506	2.76	3.81	51
60	55,800	3.10	4.13	56
55	60,780	3.27	4.50	60
50	66,960	3.60	4.96	67
45	74,400	4.00	5.50	74
40	83,400	4.50	6.20	84

Taking a burner that is but 65% efficient, showing 2.76 lbs. oil or 51 cu. ft. of natural gas and compared to 2.12 lbs. of oil or 39½ cu. ft. of gas with an 85% burner. This shows quite a worth-while saving. The energy relation between foot pounds and heat units is such that it takes 778 ft. lbs. to equal 1 B.T.U. The horse power is standard at 33,000 ft. lbs. per minute or 1,980,000 per hour.

A Modern Home Built in the Arctic

Building insulation and the part it played in Lieutenant Byrd's dash to the Pole is told in the account of the permanent home built by the explorer at Spitzbergen as an observation station. Special pains were taken in the construction of this house to protect it against the extreme cold in that region. For that purpose boards of Celotex insulating lumber, made from bagasse (sugar-cane fibre after all sugar juices have been extracted), were carried along with the explorers on the ship *Chantier*.

One of the first acts, after the arrival of the ship at Spitzbergen, was the erection of this house. Celotex was used throughout instead of lumber. The ship was also lined with Celotex as an added precaution to keep the ship warm while the explorers used it in the preliminary stages of their expedition.

The arctic home of Lieutenant Byrd and his companions was built entirely of Celotex on the basis of its giving an insulation efficiency three times as great as that of ordinary lumber and nearly twelve times as great as that of brick and other masonry materials. The fact that it also possesses great structural strength proved an advantage in permitting the explorers to carry the smallest possible stock of other building materials.

Boiler Cleaning Compounds

In a reply to one of our correspondents in last month's issue on the subject of "Violent Fluctuation in Boiler Water-Line and Its Cause," it was pointed out that there are a few good liquids which may be obtained for cleaning out boilers without the trouble or expense of emptying and refilling the system. A statement that this process could be carried out in a few minutes was intended to apply to the work attached in putting the liquid in the boiler through the safety valve or any other convenient opening. A little liquid is put in the boiler each day for several days and at the same time, about 1-in. of water level is drawn off until the difficulty is removed.

In addition to the liquid mentioned, it should be stated that a preparation in the form of a powder, which has been used with success, to conquer foaming, surging and griming by removing oil, grease, rust, scale and dirt, is known as Vinco and is put out by the Vinco Co., 75 Vesey St., New York. One of the advantages possessed by this powder is that it does its work without involving chemical reaction.

New Apparatus and Appliances

A Continuous Air Filter of Stream-Line Design

A continuous stream-line air filter, with unusual characteristics, is announced by the Reed Air Filter Company, Inc., 215 Central Avenue, Louisville, Ky., under the name of the Reed continuous air filter. This new filter has been placed on the market after two years of research and testing. Among the features of this filter are:

1. No moving parts, no gears, no chains, no sprockets, no bearings—nothing to wear out.
2. "Stream-line" filter bodies give minimum resistance to air flow and permit highest capacity per unit.
3. Cleans and charges itself automatically.
4. Minimum space required—minimum cost.
5. Standardized units interchangeable and adjustable.
6. Stationary media—nothing moves but charging liquid.
7. High cleaning efficiency.
8. Low resistance.

Fig. 2 is a cross section through the stationary media and shows the stream-line construction which embodies the principles developed by the air service during the World War in the construction of airplane struts and braces. Test showed that this construction offers less resistance to air flow than any other shape of surface.

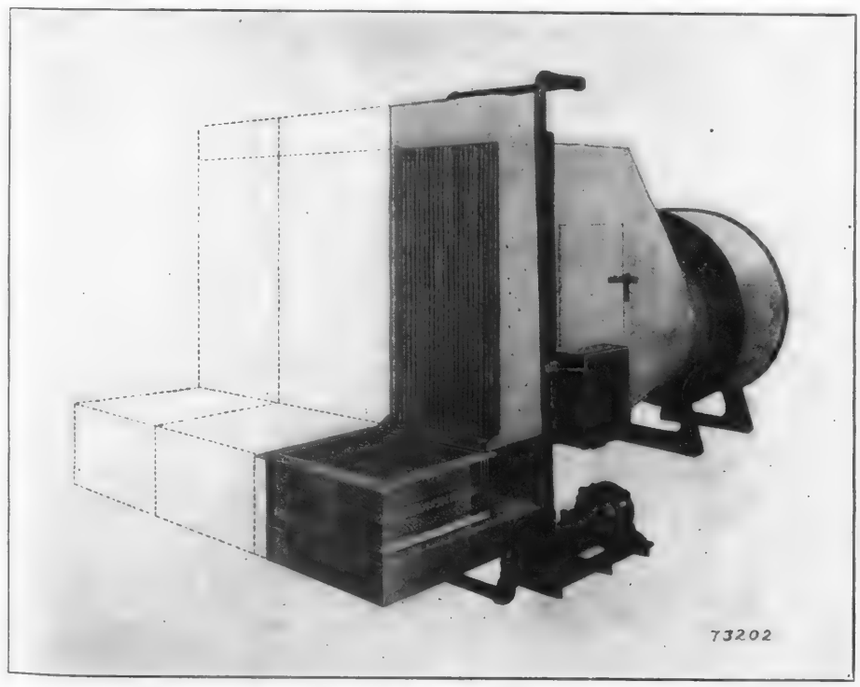
The Reed continuous stream-line filter is made in standard unit sections of 3,000 C.F.M. and 6,000 C.F.M. capacities. Additional units, it is stated, can be connected in any convenient position with a minimum use of space.

The vital feature in the design of this filter is the complete elimination of moving parts, with the exception of a small oil pump and motor.

The surfaces of the stream-line filtering media are smooth to allow the dirt and dust caught by the oil film to be readily washed off by flushing from the oil reservoir at the top.

Stream-line Design of Reed Continuous Air Filter

The pump motor is provided with an electric switch which automatically starts the pump when the fan is shut down and cuts off automatically after having operated a given length of time.



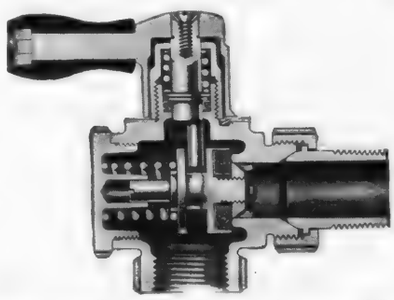
Typical Installation of Reed Continuous Air Filter

A New Modulating Radiator Valve

A modulating radiator valve of a new and unique design, for one or two-pipe low-pressure steam, vapor and vacuum systems is announced by Jenkins Bros., manufacturers of valves, 80 White St., New York. It is a patented valve with the disc and seat in a vertical plane, which is a new feature in Jenkins valve construction being designed to prevent foreign matter, such as scale and core sand, which falls from sections of cast iron radiators, from lodging on the seat. Steam, it will be noted, enters at the top of the seat and condensation drains out of the bottom of the seat. The importance of this feature in one-pipe low-pressure work is that the flow of steam into the radiator is not retarded by the returning condensation, thus helping to eliminate gurgling, water-hammer and shock. There is a vacuum under the disc holder which tends to draw the disc to the seat.

A spring holds a Jenkins composition disc against the seat and seating and tightness do not depend on a threaded spindle. The spindle is provided with a cam on the lower end, the action of which opens or closes the valve. A half-revolution of the handle turns the valve on or off.

Leakage around the spindle is prevented by the use of a Jenkins composition ring compressed by a bronze spring, both of which are held in position by a bronze cap, which screws over the top of the body. The inlet end of the body, the union nut and the disc holder guide or cap are provided with beads or ribs, in place of the customary hexagon. These beads conform closely to the grip



New Jenkins Modulating Radiator Valve

of the pipe wrench and help to prevent marring or cutting. The handle is of red Bakelite.

The valve is made of bronze, rough body, nickel plated all over, with polished and nickel plated indicator cap. It is furnished in ¾-in. size and the centre-to-end dimension conforms to the recommendations of the H. & P.C.N.A. and the Manufacturers Standardization Society.

New Automatic Control Regulators for Electric Water Heaters

A new device for controlling automatically the operation of electric water heaters has recently been perfected by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. The control is effected by a Spencer disc thermostat, which is actuated by the heated water passing over a steam metal plate, placed in contact with the thermostat.

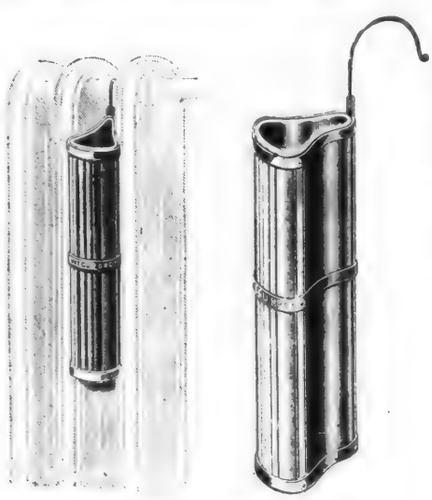
This new thermal regulator consists of the Spencer thermostat mounted in a bronze cast pipe housing above the electric heater. When the heater is turned on, the water passes over it and then through the section of pipe containing the regulator. Until the temperature of the water has reached the

upper limit of operation of the thermostat, the heater stays on, but when that limit is reached, the heater is turned off by the thermostat breaking the contact. As soon as the temperature of the water falls below the lower limit of the thermostat, the contact is made again and the heater turned on. In this way, the water is always kept at a temperature within the predetermined operating limits of the regulator.

The outstanding characteristics of the new control device are its extreme simplicity of construction and its certainty of operation.

Humidifier Attachment for Radiators

A new humidifier in the form of an attachment to a radiator, for the purpose of moistening the air, has been placed on the market by W. W. Günther, (Ransbach-Westerwald), Germany. The Wegu-Safety-Holdfast, as the appliance is called, consists of a removable, porous, earthware evaporating vessel, with

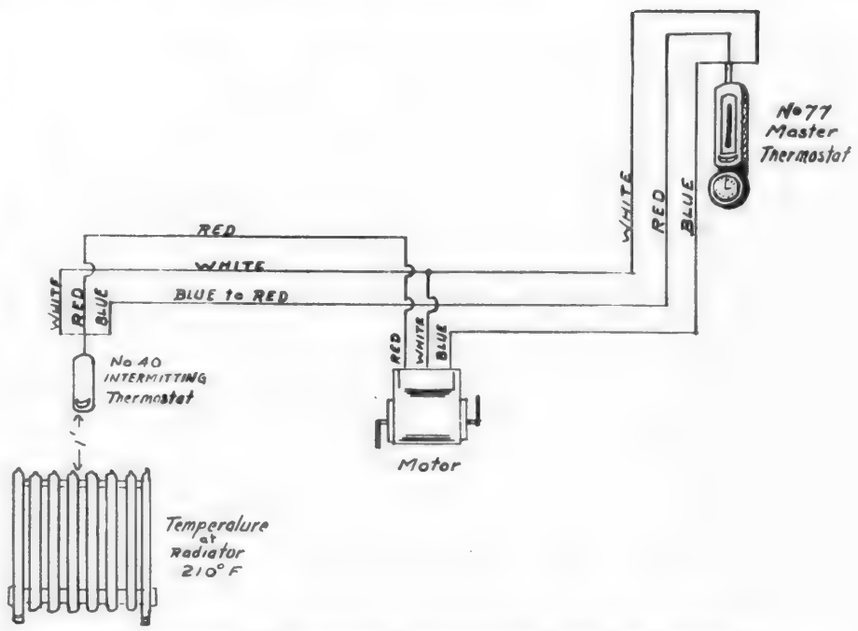


Wegu Safety Holdfast Radiator Humidifier

a protective metal frame. The whole is shaped to fit between two sections of a radiator, and a wire hook, attached to the supporting bands, is provided, by which the humidifier is suspended. The bands keep the container from coming in contact with the radiator, to avoid rusting.

Minneapolis Intermitting Control for District Heating Systems

In buildings supplied with central station heat, the idea of using intermitting control, in some cases, is more desirable than thermostatic control, especially in hotel and apartment house installations where the lapse of time between the closing and opening of the valve may allow the radiators to cool over too long a period. This may cause complaints by the tenants, although the



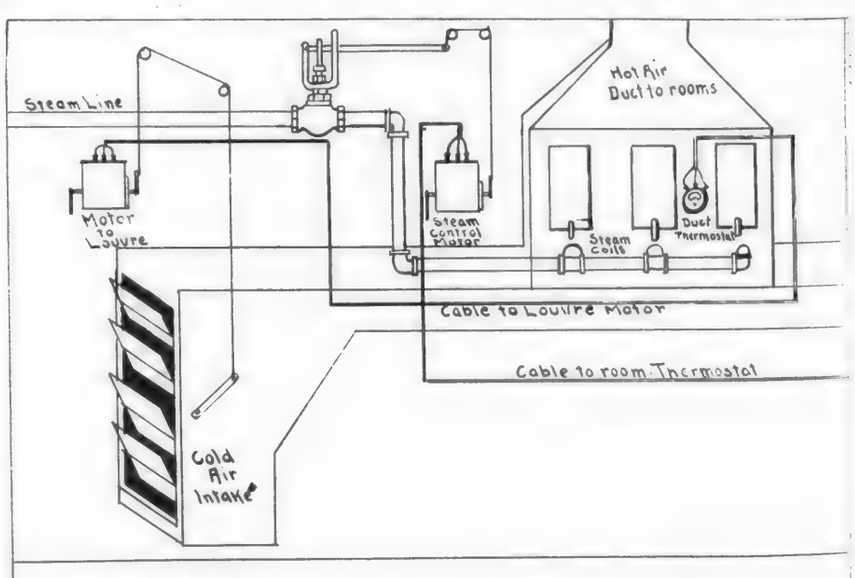
Application of Minneapolis Intermitting Control to Radiator

room temperature is the usual 70° required. Again, in hotels where rooms may be vacant and the heat shut off during the vacant period, the rooms will be without heat until the temperature in the rest of the hotel has dropped sufficiently to actuate the heat control system. In such cases, the installation of intermitting control has been used with success.

The system as here outlined, which has been placed on the market by the Minneapolis Heat Regulator Co., Minneapolis, Minn., is somewhat of a departure from the intermitting controls now on the market. It is based on the fact that during the moderate weather, there is still the tendency of over and underheating and it is almost impossible for the attendant to regulate the lapse of time the steam is put on or off, owing to the rapid fluctuation of the outside temperature. With the intermitting control here described, this feature, it is stated, is practically eliminated.

In a typical installation, the radiator thermostat is placed, say a foot above the radiator, in some part of the building. The thermostat is then hooked up to the control radiator in some other part of the building selected as the control room, the control thermostat connected to the motor operating the service control valve in the basement. We know that steam is at approximately 212° in the radiator. We will assume that the temperature, one foot above the radiator, is 126° and that the lag of the thermostat is 26°. This would allow the radiator to cool to 186° before the steam would be turned on.

The steam would remain on until the heat from the radiator reached 212°, transmitting to the thermostat a temperature of 126°, which would have the effect of again shutting off the steam. This operation is repeated until the temperature of the building is built up to the degree set on the control thermostat.



Application of Minneapolis Dual Control on Indirect Steam Heating System

Chart Showing Operation of Minneapolis Intermitting Control on a Six-Story Building with 3290 sq. ft. of Radiation

As soon as this temperature is reached, the control thermostat shuts off the steam regardless of the temperature of the radiator and it stays off until the temperature of the building drops one or two degrees.

By operating the intermitting control from the radiator, it is not necessary to assume the responsibility for changing this control at any time, since this is taken care of to a great extent by the temperature of the room. That is, the colder the room on building up the temperature in the morning, the longer is the lapse of time in shutting off the steam and the shorter is the interval it remains off. On the other hand, when the room is up to or near the desired temperature, the longer is the interval of time the steam is off and the shorter is the interval in building up the radiator to the shutting off point.

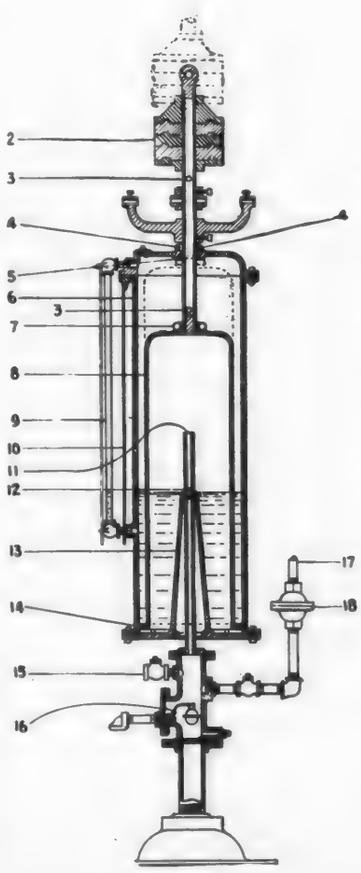
Eastman Low Pressure Heating Control

A system of control, which is described as the result of over forty years' experience in connection with the study of heat problems, has been brought out by Hanson & Parker, 50 Congress St., Boston, Mass., under the name of the Eastman low-pressure heating control. The ideas embodied in this method of control are those of Mr. Eastman, who has long experimented on the problem.

The Eastman control is operated directly from steam, either at the boiler or at the heating main. It has nothing to do with room temperature, water pressure, expansion or contraction. Connection is made from the device directly to the damper, oil burner or reducing-pressure valve, which it is desired to control. The location of the valve is not restricted to the water-line of boilers, height of cellars or height over boilers. After it is set, at the time of installation, no further attention is necessary. The control is described as so sensitive that it will operate on ¼-oz. variation from the amount of steam pressure at which it is set. The gauge has no valve.

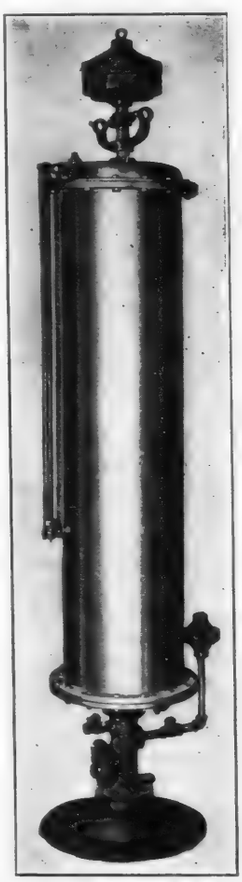
Among the results guaranteed for this control are that it will control the amount of steam pressure required for proper heat and will put a stop to the changing of pressures by the casual fireman; also, that it will operate on ¼-oz. variation, will heat buildings on 4 to 15 oz. pressure, according to size, and will overcome the lifting of water and the leaking of air valves. Other advantages mentioned for this method are that it will overcome excessive water in radiators, water-line trouble and hammering and snapping noises.

The Eastman control, it is stated, has undergone three years of tests in over seventy different plants. In four-fifths of these, it is added, the price of the control was saved in from three to six months' operation. All of the installations were in old heating plants.



Eastman Low-Pressure Heat Control.

1. Hollow piston rod.
2. Adjusting weights.
3. Air ports.
4. Guide rolls.
5. Valve seat for 7.
6. Casing.
7. Valve.
8. Piston.
9. Water glass.
10. Scale calibrated in ounces pressure.
11. Steam inlet.
12. Overflow for condensation.
13. Cone.
14. Centering rolls.
15. Vacuum breaking check valve.
16. Drip valve.
17. Steam supply.
18. Steam strainer.



New Trade Publications

TANGLDUST AIR FILTERS are the subject of a bulletin (AIA File No. 30-D-3) issued by The Cooling Tower Co., 90 Webster St., New York. In addition to views of the filter, some of them showing the two-stage construction, consisting of baffle or eliminator plates in the first stage and wire coils in the second stage, the bulletin shows a number of typical installations of Tangldust air filters, notably a 50-cell installation in the Beltzhoover School in Pittsburgh. Details are included of the principle of construction of the filter, as well as of the supporting frame for holding batteries of filters and built to meet specifications requiring dustproof joints between the filter cells and the frame itself. An added feature is the removable handling bar. Views show this feature as well as the process of cleaning the filters. The bulletin concludes with a typical specification. Size 8½ x 11. Pp. 8.

THE NEW COMFORT is the title of a characteristically, attractive catalog issued by Socony Burner Corp., 9 East 40th St., New York. This catalog tells the story of the latest model Socony Arrow oil burner. The catalog, with photographs and clever sketches, the salient features of the burner and of its application. The cleanliness with which liquid fuel is delivered from a tank wagon is portrayed and the cleanliness of the modern seller, where oil is burned, is shown in photographs of several installations. The adaptability of the Arrow burner to hot water, steam, vapor and warm air systems is given consideration, and a large portion of the catalog is taken up with photographs of homes in which the Socony burner has been installed and with reproductions of testimonial letters. The text matter is refreshingly free from exaggerating statements and in this respect alone is well worthy of emulation. Size 8½ x 11. 24 Pp.

AMERICAN BLOWER SELLING PROGRAM, in the form of magazine advertising, selling helps, newspaper advertising and sales plans, is outlined in a folder issued by the American Blower Co., Detroit. The manual starts out with the slogan that "Merchandise That Is Well Advertised Is Half Sold." An impressive list of magazines is presented, including THE HEATING AND VENTILATING MAGAZINE, in which the company's advertisements are appearing regularly. Under "Sales Helps" for American Blower contractors or contractor dealers, are given letter folders, envelopes, window displays, demonstration stands, broadsides, movie slides, newspaper advertisements, catalogs and price lists, sales bulletins and a sales program. In connection with this program, a campaign is laid out covering the entire year, with suggestions as to the titles of sales literature to be used in any given campaign. June and July is devoted to a campaign among factories, machine shops and foundries. August and September is devoted to garages and the publications suggested for use are "Economical Ventilation," "Low Cost Ventilation" and "The Air of the Mountains." October and November is suggested for campaigns among restaurants, theatres, billiard-rooms and lodge-rooms. December and January is given over to factories and machine shops again and February and March, to contractors, builders and architects. April and May is suggested as a time for a campaign among house-owners. Size 8½ x 11. Pp. 22.

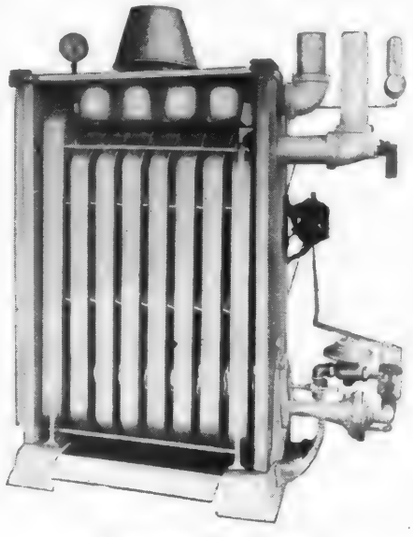
SPRACO AIR FILTERS, described as the air filter with the right media principle, are presented in a 4-page circular issued by the Spray Engineering Co., 60 High St., Boston, Mass. (listed as A.I.A. File No. 30-B-3). Among the features mentioned for this filter is that the framework is built in sections of all-welded heavy steel construction, capable of holding several cells. This sectional framework, it is stated, minimizes the cost of erection, in addition to eliminating air leaks and insuring alignment. Four quick-acting spring latches lock each cell in the framework. These latches are a permanent part of the framework. A two-point seal is provided between cells and framework and the construction is such that all air must pass through the filter media.

HEAT WITH GAS AND THE AUTOMATIC FURNACE MAN is the advice given in a bulletin devoted to the Heatomat gas boiler, issued by the United Utilities and Engineering Corp., 2220 Chestnut St., Philadelphia, Pa. The Heatomat gas boiler is described as an automatically-operated gas heater designed for steam, vapor or water heating systems. An efficiency test reported by the company shows an overall efficiency of 87½%. The boiler is of vertical water-tube construction with economizer, water walls and baffling. Special attention has been paid in the design to secure the maximum heat transfer in the water circulation. An especially-designed gas burner is used, being located beneath the arch of the combustion chamber in such a way that the major part of the heat is absorbed in the heating surface through conduction.

The water is heated in the vertical water tubes and thence rises through the heating system of the building. The returns from the heating system pass back through the economizer or water preheater section, which is located above the vertical water tubes. From thence, the water passes in a separate vertical passage down and around through a water jacket in the burner itself, where it absorbs additional heat from the burner. It then passes back into the water tubes, where the cycle of circulation is repeated.

Dirt or sediment in the returns naturally settles at the bottom of the vertical tubes and provision is made for joining the tubes at this point.

Gas enters the burner at the center of its length and is distributed to each end by enlarging passages with a view of providing uniform pressure at each point. One gas burner is used per section. At the venturi throat on the right of the heater itself is the primary air adjustment, which is permanently set at the time of installation. The secondary air, or that necessary for combustion, is controlled by the automatically-operated shutter at the bottom of the heater itself. When the burner is automatically lighted, this shutter opens in direct proportion to the flow of gas. When the flame is shut off automatically, as the desired temperature is reached, this shutter also closes automatically. In this way, cold outside air is prevented from entering the heater and cooling down the heating section when the burner is not in operation.



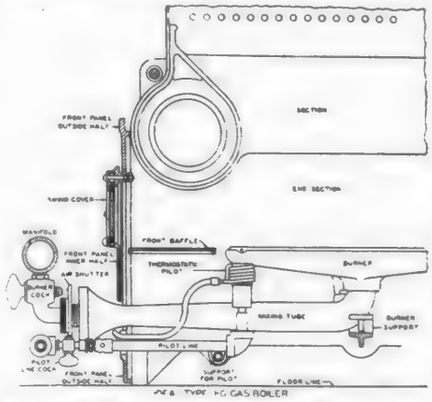
Heatomat Gas Boiler

Care has been taken in the arrangement of the baffling system of the respective sections to insure that the residual heat is diffused in a path to absorb the maximum amount of heat through convection. This, combined with the use of the economizer section, results in a stack temperature, which, the company states, is as low as 200° F.

In the case of the steam boiler, the same type of heating section is used and the water level is held at a predetermined point above the combustion arch.

The Heatomat is furnished complete with a double automatic control, one consisting of an eight-day thermostatic automatic clock and the other, a water temperature control.

HOUSE HEATING SALES MANUAL FOR IDEAL GAS BOILERS is a timely publication issued by the American Gas Products Corp., 376 Lafayette St., New York. Each type of the company's line of gas heaters is illustrated and accompanied by data on ratings and dimen-



Burner Assembly for Type 1-G Ideal Gas Boiler

sions. The line includes the Ideal Arcola gas heater for small homes, the Ideal Arcola parlor gas heater, the Ideal Type O-G gas boiler for homes up to eight or nine rooms and the Type 1-G for medium-sized and larger residences. The catalog also features the Ideal Type 4-G gas boiler for use in larger buildings. The Type 4-G boilers are furnished in capacities from 4800 sq. ft. to 8000 sq. ft. of steam radiation and from 7800 to 13,000 sq. ft. of water radiation.

Included in the catalog are descriptions of the accessories used with these heaters, including master controls, automatic and heat regulators. Drawings are presented of typical burner assemblies, while the last few pages are given over to data for selecting the proper size boiler, proper chimney sizes, area of radiator heating surfaces and burner spuds or various capacities at varying gas pressures, also gas consumption per burner and available B.T.U. and H.P. steam ratings for Ideal gas boilers. Size 4½ x 9 in. Pp. 24.

BOILERS ARE KNOWN BY THE BUILDINGS THEY HEAT is the caption given a blanket folder, issued by the General Boilers Co., Waukegan, Ill., devoted to the Pacific steel heating boilers. Views are shown of important buildings recently equipped with Pacific boilers, including the Claus Spreckels building in San Francisco; the Inter-Fraternity Club, New York; the Allison Club, Chicago; the Medical Arts Building, Dallas, Tex., and the Gilford Apartments in New York. Mention is made of the fact that the fire-box in this boiler extends the full length of the shell, so that every inch of the inside of the fire-box is direct heating service. The fire-box thus constitutes a water leg, with the lower half of the shell exposed to the open fire. Other features mentioned for this boiler include its large combustion chamber, the length of its fire and gas travel, and the saving it effects in boiler-room floor space.

VINCO, described as a cure for priming, foaming, surging and slow steaming in boilers through removal of causes such as oil, grease, coarse sand and scale, is the subject of a circular issued by the Vinco Co., Inc., 75 Vesey St., New York. The circular contains directions for using Vinco, as well as quantities required for different size boilers. Included in the circular is an impressive guarantee of its action.

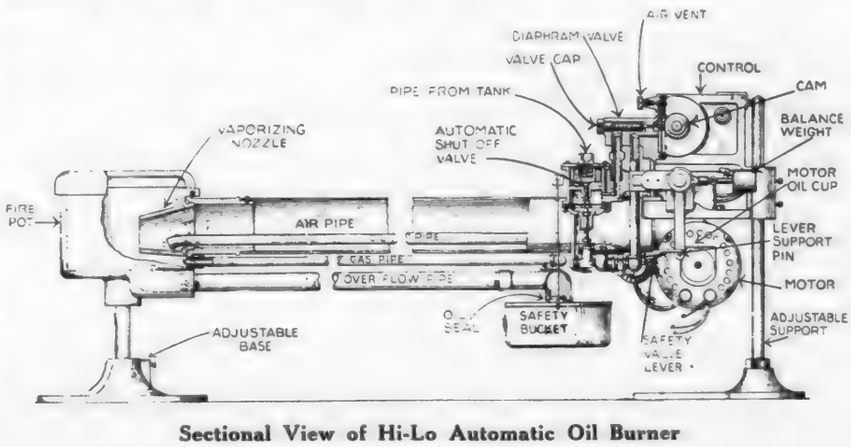
ELECTRICAL EQUIPMENT FOR HEATING AND VENTILATING SYSTEMS (A.I.A. File No. 31B), devoted to the operation of Westinghouse electric motors for driving fans and blowers, is presented in an elaborate catalog issued by the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Motors and their application for heating and ventilating of modern buildings is treated at length. The manual contains 9 pictorial pages showing office buildings, hotels and other structures in the mechanical equipment of which Westinghouse motors play a prominent part. An interesting feature of the catalog is a discussion of the types of fans and the types of motors available for fan drive, types of control, and distinctive characteristics of motors and control, with illustrations of equipment. Two pages of engineering data complete the circular. Included in the data is a chart for determining resistance of air ducts. Characteristic pressure curves for centrifugal fans are another feature of the manual. Size 8½ x 10¾ in. Pp. 24.

HEATING THE HOME WITH OIL is the title of a catalog issued by the Gloria Light Co., Chicago, featuring the Hi-Lo oil burner. Among the distinguishing features of this burner are the absence of compression pumps, oil pump, gas pilot control, start control, atomization control, magnetic control or float. In connection with the "high-low" feature, the burner produces a certain proportion of heat in accordance with weather conditions and without electrical power. This condition is called "low." When operating on "high," a small motor operates the blower. In operation, the oil is delivered to the burner, where it is vaporized and then mixed with a whirling column of air in the necessary proportion. The oil, it is pointed out, is not atomized or sprayed cold and burned in suspension. The Hi-Lo oil vapor burner is furnished with or without a gas pilot as desired. When not equipped with the gas pilot, a piece of crumpled newspaper is used to ignite the oil.

GRAVER ZEOLITE WATER SOFTENER, in which use is made of the downflow method of softening with a natural Zeolite mineral, supported by a strainer plate, is the title of a new bulletin (A.I.A. File No. 29d32) just published by the Graver Corp., East Chicago, Ind. The bulletin is illustrated with views of installations and of the softener and equipment. In this process, the strainer plate, which is attached to the shell of a softener is perforated with equally-spaced slots to provide thorough distribution, eliminating the necessity of a concrete fill in the bottom of the softener tank.

STERLCO MOTOR-DRIVEN PUMPS, including the Sterlco condensation pump and receiver, Sterlco high-pressure units, Sterlco separating pumps and strainers, are presented in Bulletin No. 37 (A.I.A. No. 30C5), issued by the Sterling Engineering Co., Milwaukee, Wis. Each type is described in detail with a table of data for each size. Size 8½ x 11. Pp. 5.

STEAM ECONOMY is the title of catalog (No. S-33) issued by the Republic Flow Meters Co., 2240 Diversey Parkway, Chicago. The publication gives thorough discussions of steam meters, water meters, gas meters, carbon dioxide recorders, pyrometers, draft instruments and coal meters. Some of the topics discussed in connection with the use of flow meters are: centralized control of steam production and distribution, the necessity for instruments in plant operation and management, cuts in steam costs, the elimination of guesswork in boiler operation, the placing of the power plant on a basis of known efficiency, the importance of boiler-room records, and power plant cost accounting. A section is devoted to the application and use of meters in various kinds of plants; another, to the operation and installation of meters and a third, to the arrangement of boiler panels. Size 8½ x 11. Pp. 56.



Sectional View of Hi-Lo Automatic Oil Burner

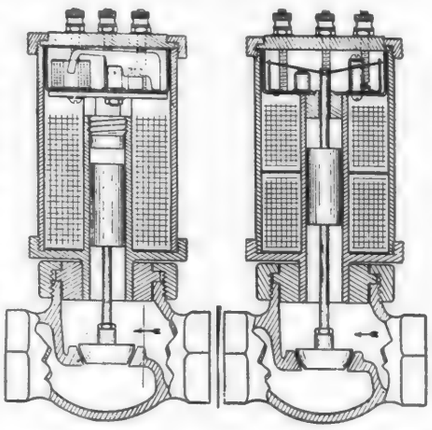
PAGE BOILERS, VOLUNTEER AND MONARCH, adapted to heating by steam, vapor and hot water, are described at length in Catalog No. 52 of the William H. Page Co., 200 Madison Ave., New York. The types presented are the Monarch water-tube boiler, which is designed to burn hard or soft coal, gas or oil; the Monarch smokeless boiler, which burns hard or soft coal or coke; and the Volunteer boiler, for use with all fuels. A notable feature of the catalog is its listing of what are termed "Page Safe Ratings", in addition to the commercial ratings, based upon tests made in accordance with the A.S.H. & V.E. Low-Pressure Boiler Code. The "Page Safe Ratings" run about 25% below the commercial ratings. Tables include 41 stock sizes for the water-tube type and 42 sizes for the smokeless type. Volunteer rated boilers are made in four series for steam and water, respectively, embracing a range from 325 to 1500 sq. ft. of steam radiation and 550 to 2500 sq. ft. of water radiation. Size 8½ x 11. Pp. 15.

BOOSTER TO BETTER BUSINESS is the caption of a 6-page folder describing Janette motorized blowers, issued by the Janette Mfg. Co., 556 West Monroe St., Chicago. A number of types of blowers designed for use with oil burners are shown with tables of sizes and dimensions. Each type is designed for use with either direct or alternating current. Emphasized in the folder is Motorized Blower SA20, which is said to draw a starting current of less than 15 amps. and may be connected to an ordinary lighting circuit.

AS NECESSARY AS PURE WATER is the claim made for the Phoenix automatic self-cleaning air filter in a bulletin issued by Drying Systems, Inc., 1800 Foster Ave., Chicago. A distinguishing feature of the Phoenix is its rotating screen, which is held in place between two sprockets, one of which is driven by a ¼-H.P. motor. The screen, in passing under the lower sprocket, is immersed in a tank filled with a cleaning fluid which removes the dust and allows it to collect in the bottom of the tank; hence, the filter is self-cleaning.

ILLINOIS HEATING SYSTEMS is the title of an attractive catalog issued by the Illinois Engineering Co., Chicago. Following a short general description of the Illinois system, the catalog is composed of illustrations of typical buildings of various types and sizes, which are Illinois equipped. Among the buildings illustrated, which are so equipped, are the Pennsylvania Building, New York; the Southwestern Bell Telephone Building, St. Louis; the Conway Building, Chicago; the Pere Marquette Building, New Orleans; the United Masonic Temple, Chicago; the Kansas City Club, Kansas City, and the Nautilus Hotel, Miami. Size 8 x 10¾. Pp. 143.

MINNEAPOLIS GAS VALVES, as recently perfected, are the subject of a bulletin received from the Minneapolis Heat Regulator Co., Minneapolis, Minn. These valves are of the magnetic type and are furnished in two series. They are equipped with Minneapolis thermostatic relay switches, designed to operate with the room type of thermostat. Both of the company's new types, known as Series 10 and Series 20, are similar in outward appearance and in general design. They have an all-metal bulb, described as rust-proof and non-corrosive. The Series 10 valve requires a special thermostat for its operation, known as the Minneapolis Series 10. These thermostats are available in all types and differ from the standard Minneapolis line in the wiring principle and contact system. The basic principle employed is the making at the thermostat of a circuit to open the valve, and breaking of the same circuit, which allows the valve to close by the force of gravity. In this way, any failure of wiring, breakage, poor connections, etc., through the closed circuit wiring automatically shuts off the valve. Likewise, the failure of electric power or its interruption automatically closes the valve by gravity. The Series 20 valve can be used with any standard Minneapolis thermostat. A circuit is made to open the valve and when the room reaches the required temperature, another circuit is made to close the valve. The Series 20 valve can also be operated by pushbutton control. The valves are furnished with transformer for use of 110 volt, 60 cycle A.C. and can be furnished on special order for 110 volt, 40 or 25 cycle A.C. For 220 volt A.C., a special transformer can be used to reduce the current to 110 volts. The valves are furnished in sizes running from ⅜ in. to 1½ in.



Series 10 Valve. Series 20 Valve.

Cross-Sectional Views of Series 10 and Series 20 Minneapolis Gas Valves

COMPARISON OF MANUFACTURERS' FIGURE NUMBERS ON VALVES is the title of a tabulation sheet issued by the Scott Valve Mfg. Co., Detroit, Mich., showing a comparison of figure numbers of valves as made by leading manufacturers of bronze and iron-body valves. This tabulation is much more complete than any similar sheet previously available, as it not only lists the figure numbers, but gives sufficient detailed specification to identify the valve without reference to the manufacturers' catalog. This handy reference sheet will be appreciated by the architect, purchasing agent, engineer or plant manufacturer. Copies are available by addressing the Scott Valve Manufacturing Company.

ELECTRIC VENTILATION is a well-compiled catalog issued by the American Blower Co., Detroit. In addition to many views showing the wide variety of application of the electric ventilating stand, a number of designs are included of typical installations of electric fans in small theatres and billiard rooms, resturants, offices and stores, bakeries and laundries and storage battery and garage service stations. Size 8½ x 11. Pp. 32.

RAWPLUGS HOLD SCREWS IN ANY MATERIAL is the theme of a folder issued by The Rawplug Co., Inc., 66 West Broadway, New York. Rawplugs are made of jute and are inserted in brick, tile, concrete, marble, plaster, or wood before the screws are applied. When the screw enters the plug the fibers, of which the plug is composed, are expanded and are forced into the surrounding material so that the screw fastening is secure.

New Publications

KANSAS COAL, ITS OCCURRENCE AND PRODUCTION AND ITS CHEMISTRY, is the subject of Engineering Bulletin No. 13 and Chemical Research Division Bulletin No. 4, issued by the University Engineering Experiment Station, University of Kansas, Lawrence, Kans. The authors are Professors C. M. Young and H. C. Allen. Size 6 x 9 in. Pp. 202.

C. A. Dunham Company's New Building at 450 East Ohio Street, Chicago

Present Accepted Practice in Domestic Oil Burners

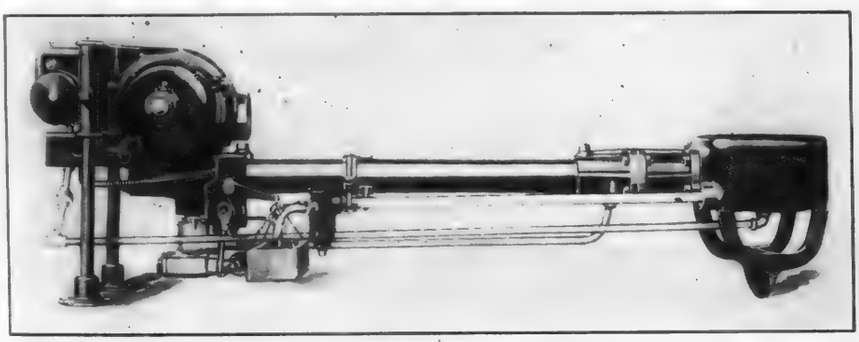
20. Nokol. *Atomizing, Combustion-pot Type, Mechanical Draft, Gas Ignition*

Previous articles in this series are:
1. *Kleen Heet, July*, 1925.
2. *Baker, July*, 1925.
3. *Kerrihard, July*, 1925.
4. *Silent Glow, August*, 1925.
5. *Aetna, August*, 1925.
6. *Caloroil, September*, 1925.
7. *Oil-O-Matic, September*, 1925.
8. *Chalmers, October*, 1925.
9. *Hart, October*, 1925.
10. *Sun, October*, 1925.
11. *Rayfield, November*, 1925.
12. *A. B. C., November*, 1925.
13. *Electrol, December*, 1925.
14. *Grant, January*, 1926.
15. *Nu-Way, January*, 1926.
16. *Wayne, February*, 1926.
17. *May, February*, 1926.
18. *Ray Rotary, March*, 1926.
19. *Super Oil Heator, May*, 1926.

20. Nokol

FIRST designed to produce steam for automotive use, the Nokol oil burner, manufactured by the American Nokol Co., Chicago, was placed upon the market as a domestic oil burner in 1918. The burner is of the fire-pot type, air for combustion being furnished by a blower, the outlet of which is joined to the combustion pot by a blast tube.

Located in the blast tube, near the combustion chamber end, is a venturi tube, with its axis parallel to that of the blast tube. Oil is drawn into the throat of the venturi by reason of the vacuum created by the blast of air through the tube, atomization taking place as the oil is blown from the end of the venturi nozzle.



Old-Type Nokol Oil Burner

The shape of the combustion chamber is such that the ignited gas is divided, and the flame literally wraps itself around inside of the chamber walls. Gasification is largely the result of thus forming a cylinder of flame around the incoming mixture of atomized oil and air, the chief objection to the operation being the combustion noise resulting from the high rate of flame propagation.

The New Silent Feature

The latest type of Nokol, now ready to be placed upon the market, is substantially the same as the previous models, with the addition of a method of decreasing combustion noise through the dilution of the incoming oil-air mixture, this dilution decreasing the rate of flame propagation in the combustion chamber. This is accomplished by drawing, from the boiler stack, through a flexible pipe, some of the hot products of combustion, and admitting this hot gas, in carefully metered quantity, to the intake of the blower.

When the burner is first started, only cold air is admitted to the blower, the stack pipe being closed through a butterfly valve. As soon as ignition is accomplished, the valve is slowly opened through the medium of a flat cam on the end of the Honeywell master control. The opening of this valve requires from one to three minutes, according to the conditions of installation.

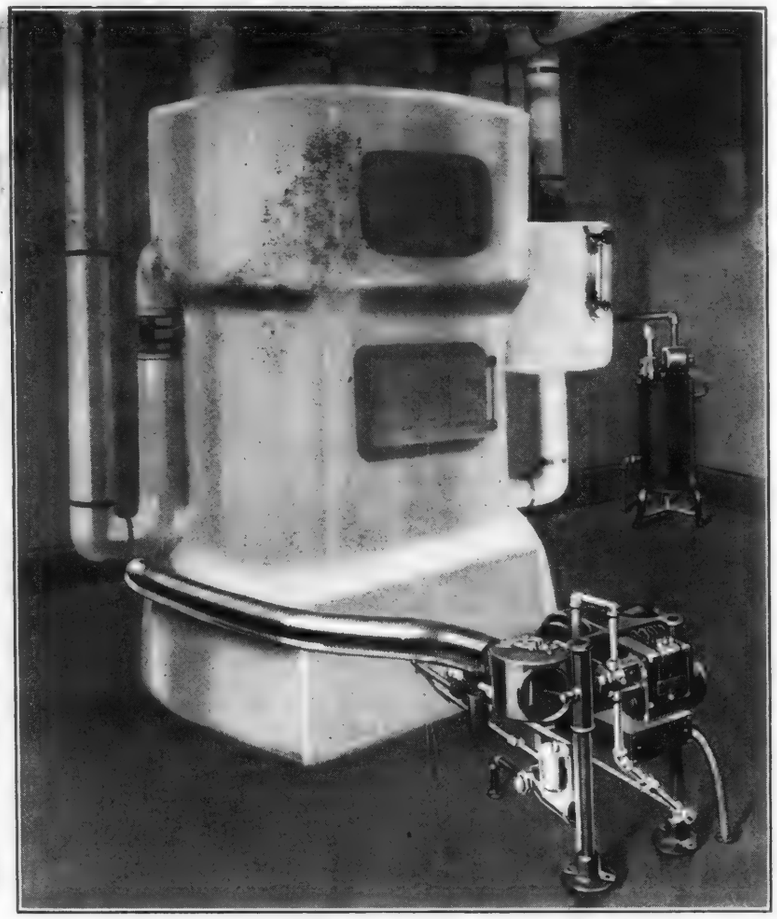
The diluting gas, mostly CO_2, is, of course, not a combustible, and the result of its introduction decreases the average temperature in the combustion chamber, giving added life to this element. Audible evidence of the ability of this device to reduce combustion noise is manifested by slowly closing the shutter by hand when the burner is in normal operation, the change to undiluted cold air being accompanied by the noise of combustion characteristic of the older type of burner.

Short Flame of Old-Type Nokol Burner

Expanding Pilot Gas Ignition

Ignition is secured through an expanding gas pilot, controlled by the Honeywell unit. The pilot flame is introduced through the bottom of the combustion chamber, proper means being taken to protect the flame from air drafts. Oil is maintained in a constant-level chamber under the fan, and it is therefore impossible for oil to get into the venturi unless the blower is in operation. Provision for failure of ignition is provided in a drip bucket, to which is piped the floor of the combustion chamber. Tripping of this bucket opens the motor circuit and closes the fuel line.

Flame of the New-Type Nokol Burner—Lifted Well Above the Combustion Pot



Installation of New-Type of Nokol Burner, Showing Flexible Pipe for Stack of Mixing Box at Fan Intake

The Nokol burner is listed by the Underwriters to burn fuel not heavier than 36 A.P.I. It is built in seven sizes, designed to meet all requirements between the modest cottage and an apartment house or business block. The new feature should make it particularly desirable for use in warm air furnaces, where quiet operation is of the utmost importance.

Underwriters Announce New Listings

Last-minute advices from the Underwriters' Laboratories announce the listing of the following, to appear as a July list:

DOMESTIC BURNERS

Summerheat, Type S, The Beckwith Company, Dowagiac, Mich.

Security, Model S, The Security Stove & Mfg. Co., Kansas City, Mo.

Rayfield, Model L, Rayfield Mfg. Co., Chicago, Ill.

Johnson, Type 26A, S. T. Johnson Co., Oakland, Cal.

Silent Automatic, Type A, Silent Automatic Burner Corp., Detroit, Mich.

Paramount, Type D.

Field, Type L, Field Engineering Co., Chicago, Ill.

INDUSTRIAL BURNER

May, Type C, May Oil Burner Corp., Baltimore, Md.

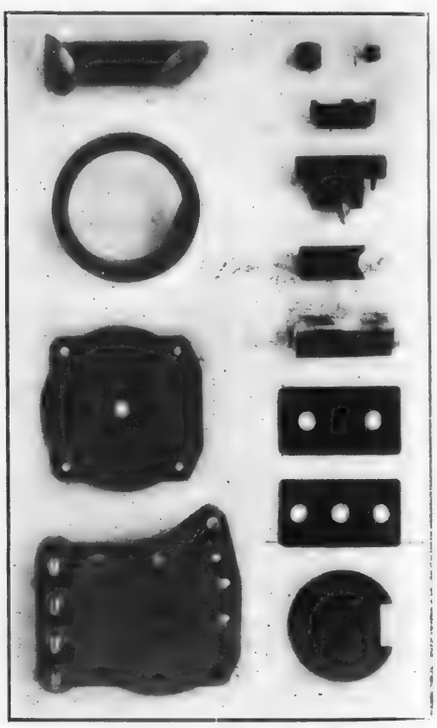
Making An Order An Order

The abuse of so-called blanket orders for goods is something that is receiving increased attention by the heating industry, as was reflected in the discussion of this subject at the recent meeting of the Central Supply Association. At that meeting, for instance, experiences were related revealing abuses of so-called blanket orders for goods in large volumes, but without specification of sizes and amounts of different assortments. The frequent practice of indefinite delay, it was brought out, in sending the specifications often nullifies the order, if it does not cancel it.

This form of order was unanimously denounced and it was urged that manufacturers accept only such orders as were strictly bona fide and where specifications were necessary, to insist on their following in a reasonable stipulated period, preferably not more than ten days later than the date of the order. As an excellent example to follow, the ironclad non-cancellable contracts that manufacturers must conform to in the purchase of pig iron, copper and other raw materials were cited.

Bakelite Enters the Oil-Burning Field

The importance of Bakelite in the field of home-heating appliances is evidenced by the prominent part that this product takes in the construction of the Socony burner, which contains more than 30 Bakelite parts. Bakelite is light, durable, strong, heat resisting, non-corroding, unimpregnable by oil or water and electrically a high insulator. This peculiar combination of physical characteristics make it as desirable in the construction of oil-burning equipment as in the construction of many other products on the commercial market. The product has been adopted by designers of the Socony burner because of its effective insulation, for high-tension conduits and switch bases, for resistance to wear and to the effects of lubricating oil. Simplicity of manufacture is also effected by its use as Bakelite can be molded complete with metal inserts, holes and threadings all in a single operation.



Molded Bakelite Parts Used in Socony Oil Burner

Left (reading down): High-tension wire conduit to spark plug, combustion safety-switch frame, plate cover, contact plate.

Right (reading down): Valve seat (left) insulating washer (right), insulating cleat, fuel-supply safety-switch base, cable insulator, fuel-supply safety-switch arm, insulating plate for lead-in wire, insulating plate for thermo wires, combustion switch oscillating plate.

This material is used for contact plates and their covers, for the bases of various switches, for high-tension conduits and insulating plates, for insulating bushings and washers, for low-voltage cleats, for the seat in the air supply valve and for other parts where resistance to the effects of lubricating oil, as well as safety, are necessary.

Remote Control of Temperature

That none of the steam generated for heat should be sent to parts of the building where it is not needed, in the Bell Building, Chicago, a Pneumatic Switchboard for remote control of risers was installed.

By this means the engineer is enabled to control the heat to the best advantage. If a strong wind off the lake, for instance, calls for plenty of heat to be supplied to the east side of the building, the engineer throws the pneumatic switches controlling the risers on that side, opening those valves. At the same time air currents in the building may carry so much of that heat to other parts of the building that no heat supply will be required there. Therefore the engineer, through the Pneumatic Switchboard, closes the valves in certain other risers, thus conserving his steam, and consequently saving fuel.

How It Works

Each switch on the Board is numbered, the numbers corresponding to those on the diagram of piping around the front of the Board showing the riser valves.

This diagram approximates the ground plan of the building, which covers 65x130 feet of ground, so the engineer easily controls the supply of heat to the several sections of the building without leaving the engine room, and can send steam to the one or more portions needing it, without wasting any in those parts that do not require it.

This saves not only fuel but time and labor as well, and gives prompt service to the tenants.

Other Applications

This pneumatic control handles dampers and valves that would otherwise be almost or completely inaccessible.

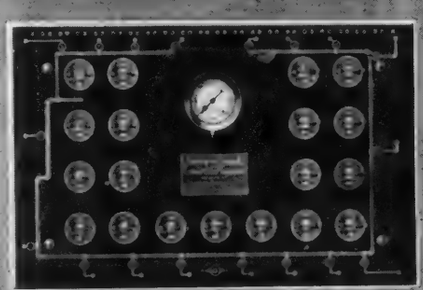
A ventilating system frequently comprises means of bringing in fresh air, exhausting used air, and also ducts and equipment which permit of recirculating the air within the building, under certain conditions. This calls for large dampers, usually of the louvre type—and these are often of varying sizes and very distant from each other. By the use of the Powers Pneumatic Switch the entire operation of these dampers can be localized on a switchboard placed conveniently in the engine room.

Send for This Book

The Powers Pneumatic Switch is of very sturdy construction, and can be relied upon to remain tight, and to function, indefinitely.

Upon request we shall be glad to send a copy of our book "The Elimination of Heat Waste," which tells more about this detail of the Powers System and gives further information regarding other types of Powers Control.

BELL BUILDING—CHICAGO
Architects: K. M. VITZTHUM
J. J. BURNS
Consulting Engineer: MARTIN C. SCHWAB
Heating Contractors: MEHRING & HANSON



PNEUMATIC SWITCHBOARD
For remote control of risers, as installed in the Bell Building.
John C. Erickson, Building Engineer, here controls supply of steam to all risers in the building.

THE POWERS REGULATOR COMPANY

35 years of specialization in temperature control

2772 Greenview Ave., Chicago

Atlanta	Charlotte, N. C.	Detroit	Los Angeles	New York	San Francisco	Seattle
Baltimore	Cincinnati	El Paso	Milwaukee	Philadelphia	CANADIAN OFFICES	
Boston	Cleveland	Houston	Minneapolis	Pittsburgh	Toronto	Winnipeg
Buffalo	Denver	Indianapolis	Nashville	Rochester	Montreal	Calgary
Butte, Mont.	Des Moines	Kansas City	New Orleans	St. Louis	Halifax	Vancouver

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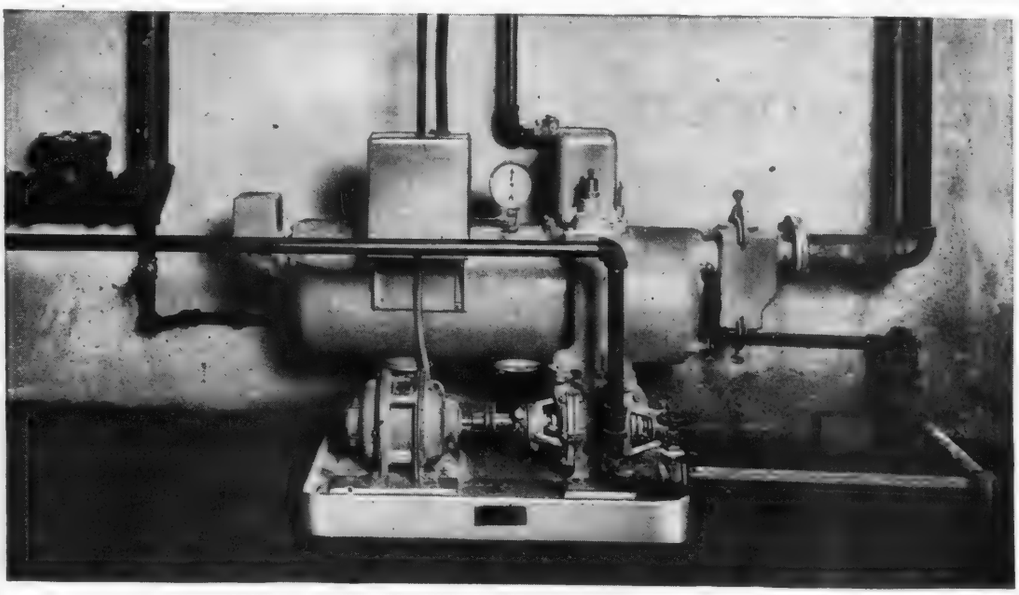
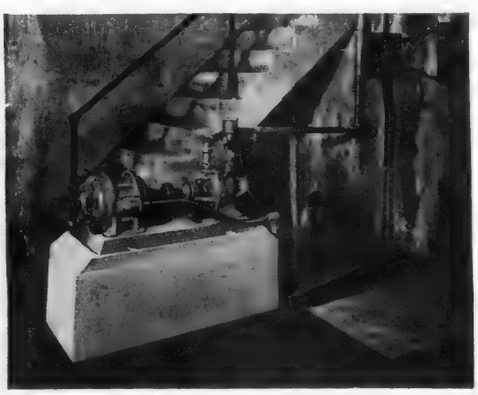


Motor-driven Jennings Vacuum Pump, size B-20, suitable for 16,000 sq. ft. equivalent direct radiation. Installed on the return line of the heating system in the Fox Building, Hartford, Conn.

As good years later as the day it was installed



Motor-driven Nash Hytor Compressor, size ½-0, installed as a sump pump in the Fox Building.

Speak to any building engineer or superintendent who is responsible for the operation of a Jennings Heating Pump, and he will tell you that the Jennings is as good after many years service as it is the day when installed.

And he is right. There is no metal-to-metal contact inside a Jennings Pump that can cause wear, resulting in a decrease in vacuum. The original high efficiency is maintained throughout the life of the unit. Other than periodical lubrication and packing, no attention is required. And since the air is withdrawn from the return line independently of the water, and **discharged to the atmosphere without back pressure,** power is saved, in some instances as much as 50% of that required by reciprocating equipment of equivalent capacity.

BRANCH SALES OFFICES

UNITED STATES: Atlanta, Birmingham, Boston, Buffalo, Chattanooga, Chicago, Cleveland, Dallas, Denver, Detroit, Indianapolis, Kansas City, Memphis, Miami, Minneapolis, New Orleans, New York, Omaha, Philadelphia, Pittsburgh, Portland, Richmond, St. Louis, Salt Lake City, San Francisco, Seattle, Tampa, Washington, D. C. CANADA: Montreal, Toronto and Vancouver. EUROPE: London, England, Norman Engineering Co. Brussels, Belgium, and Amsterdam, Holland, Louis Reijners & Co. Oslo, Norway and Stockholm, Sweden, Lorentzed & Wettre.

NASH ENGINEERING COMPANY
South Norwalk Connecticut

Jennings Pumps

RETURN LINE AND AIR LINE VACUUM PUMPS CONDENSATION AND CIRCULATING PUMPS

Trade and Miscellaneous Notes

Miscellaneous Notes

Louisville—Included in the list of exhibitors at the convention of the National Association of Master Plumbers at Louisville, June 21-25, are the following heating firms: American Radiator Co., Buffalo; The Borden Co., Warren, O.; Carnegie Institute of Technology, Pittsburgh; Cleveland Gas Burner and Appliance Co., Cleveland; Crane Co., Chicago; Ever-Hot Heater Co., Detroit; Excelso Specialty Works, Buffalo, Hoffman Specialty Co., New York; Jenkins Bros., New York; Mueller Co., Decatur, Ill.; National Tube Co., Pittsburgh; Nye Tool & Machine Works, Chicago; Oster Mfg. Co., Cleveland; Pierce, Butler & Pierce Mfg. Corp., New York; Toledo Pipe Threading Machine Co., Toledo, O.; Warren Webster & Co., Camden, N. J.; Weil-McLain Co., Chicago, and "X" Laboratories, New York.

Washington, D. C.—A general conference in the Department of Commerce, in the interest of the utilization of metal, resulted in the discarding of 762 little used and little specified sizes of valves and fittings, and of 18 sizes of pipe. A simplified list of standard sizes and the rejection of specified and little used sizes of pipe, valves and pipe fittings will result in the saving of several million dollars annually by consumers, distributors and manufacturers, it was stated. Production according to the standards agreed upon is to become effective September 1, 1926, but January 1, 1927 is to be effective of spot stock. A committee to consider further revision of sizes will be appointed.

E. B. Langenberg, St. Louis, president of the National Warm Air Heating & Ventilating Association, is writing a series of articles for the St. Louis *Globe-Democrat* on the installation and operaton of the modern heating plant in the home. Among the topics discussed in Mr. Langenberg's articles are chimney sizes, and the work of the N.W.A.H. & V.A. Research Residence.

Settlements by Arbitration have been made at the average cost of $20.00 during the first three months of the existence of the American Arbitration Association, according to a report by Lucius R. Eastman, chairman of the association. During that period, 53 hearings were held on matters of arbitration, 41 awards were made and 55 matters were amicably settled without resort to arbitral machinery.

The report states that four advisory councils are being created for the purpose of assisting the association in its work. The council on trades comprises the chairmen of trades committees, who act as advisors for arbitral facilities within their respective trades. The council on research and education comprises representatives from seventy different trades who advise concerning research in the various trades and methods of education for members of these trades. The council on legal problems is composed of jurists and lawyers who advise concerning legal questions. The council on arbitral instruction is formed of educators who collaborate with schools, universities and colleges.

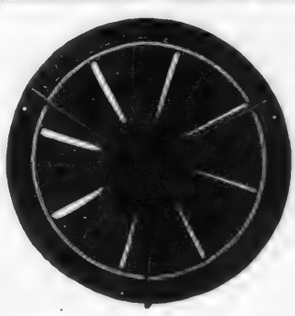
Building Permits for April, according to the F. W. Dodge Corporation, amounted to $371,679,100 in 205 representative cities. This shows a decrease of 10% from the amount reported in April of last year. March also showed a decline of 5% from March of last year. There were 77 cities with increased permit valuations over April, and 128 cities showing decreased permit valuations.

Building permits granted in these cities during the first four months of

Why do we use "Heavy Duty" Motors?

Because They Eliminate Burn-outs or Overload!

EXCLUSIVE PATENTED FEATURES



RIGIDLY GUARANTEED THROUGHOUT

AUTOVENT—*"The Well-Built Fan"*

MOTOR—The enclosed, protected type motor is of special Autovent design. It is radiation cooled by patented process.

BEARINGS—Constructed of cast bronze alloy having large wearing surface. Self-aligning and interchangeable.

WHEEL—Bored and reamed hub to which steel spokes are securely riveted. Blades and spokes oxy-acetylene welded and riveted to outer rim. All wheels accurately balanced.

SHAFTS—The shafts are of extra quality shaft steel and are ground to fit the bearings.

INSTALLATION—Easiest to install. Fan frame can be installed separately, allowing motor and wheel to be inserted later. The weight of fan for installing is thus greatly reduced.

GUARANTEE—The complete unit, fan and motor, supplied and rigidly guaranteed by us. You can rely on us for absolute responsibility.

AUTOVENT FAN & BLOWER CO., 730-738 W. Monroe St., CHICAGO

OFFICES IN ALL PRINCIPAL CITIES

1926 amounted to $1,230,907,900, as compared with $1,250,011,200 in the first four months of last year; a decrease of 2%. The F. W. Dodge Corporation records for construction contracts have shown a considerable gain during this period over last year. This difference is shown in the two records because contract records cover certain public works whicn are not included in the permit figures.

There were 18 "honor roll" cities, or cities showing more than a million dollars in total permits and an increase of 20% over their totals for April of last year. Last March there were 28 on the "honor roll." Those in April were: Albany, Ashville, N. C.; Birmingham, Ala.; Boston; Evanston, Ill.; Fort Worth, Tex.; Gary, Ind.; Houston, Tex.; Johnstown, Pa.; Knoxville, Tenn.; Mt. Vernon, N. Y.; Newark, N. J.; New Haven, Conn.; Sacramento, Cal.; Tampa, Fla.; Utica, N. Y.; Washington, D. C., and Youngstown, O.

Colfax, Cal.—The new $250,000 Placer Union high school is to be heated by electricity, it was recently decided. The architect is H. W. Weeks.

American Construction Council, in its national survey of construction conditions, reports that although the first four months of 1926 showed the greatest volume of building construction yet seen for the same period of any year, and exceeds by 20% the similar period for 1925, which itself was a record-breaking building year, this condition is not uniform as some localities show a recession and there are some indications toward greater moderation. The last part of April showed a slight seasonal decrease from the rate of the preceding months, which, however, is partially due to the fact that spring work has come into the market earlier than usual this year as a result of the continuous campaign for all-year-round work carried on by the council and its affiliated branches of the industry of the country as well as by the government.

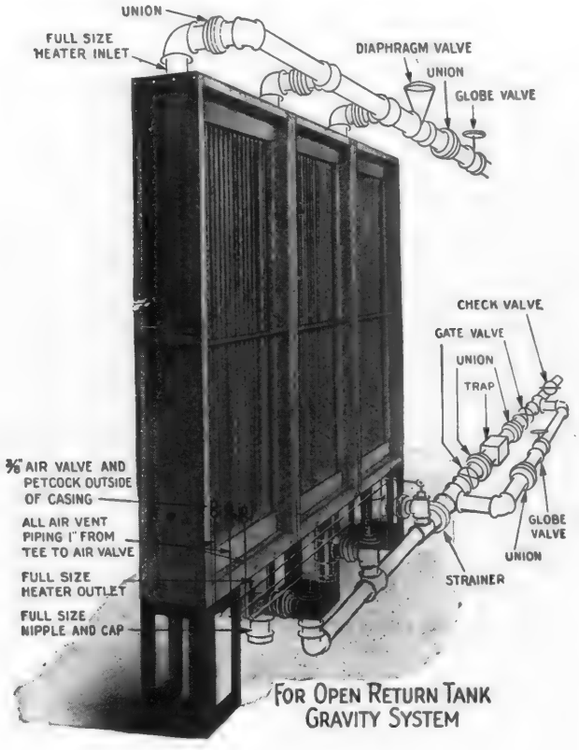
It is difficult to tell, continues the report, whether the growth of new industrial and commercial buildings will continue to go down on the books the next six months as fast as it has during the past year. A distinct note of caution has been sounded by many individuals and many groups. In the matter of high-priced apartments and hotels a similar note of caution has been sounded. It is only in the group of medium-priced well-built private dwellings that the demand seems to warrant real optimism. This demand for homes must not be confused with artificial real estate booms.

Heating and Piping Contractors Boston Association, has definitely adopted certified heating in that city. Plans have already been submitted to the association's engineers for checking, and a permanent engineer to have charge of the work will be appointed.

The Boston Evening American and Daily Advertiser, Boston, will begin printing in August a series of advertisements under the general caption of "Heat Your Home With Oil." The advertisements are in the form of pen sketches identified with reading matter which stresses the advantages and comforts to home-owners resulting from the use of the oil type of heating plant. Among the topics to be discussed are: "Awake to the new heating comfort!", "The modern furnace tender", "Uniform heat from basement to attic!", "A club room in your basement" and "Ash-cans no longer necessary!"

Manufacturers' Notes

New York—The sixty-second convention of salesmen and representatives of Jenkins Bros., manufacturers of valves and mechanical rubber goods, was held June 7-10, commemorating the sixty-second year of Jenkins Bros. business. The convention took on an international aspect as there were salesmen present, not only from the United States, but from Canada, England, Cuba and Mexico.



AEROFIN CORPORATION
750 Frelinghuysen Avenue
Newark, N.J.
L. C. Soule, *Sec'y and Sales Manager*

AEROFIN
Fan-System Heating Surface

To Engineers, Architects and Contractors

THREE YEARS OF SUCCESSFUL SERVICE demonstrates that AEROFIN has established itself as a dependable product.

ENGINEERS OF NATIONAL REPUTATION AND TWENTY YEARS' EXPERIENCE WITH FAN SYSTEM HEATERS, are responsible for the design, development, manufacture and marketing of AEROFIN, and their services are at your command to assist you in working out your heating, ventilating, cooling and drying problems.

SINCE THERE IS NO EQUAL TO AEROFIN, WHY NOT SPECIFY IT OUTRIGHT? Plans and specifications should show sizes and number of units, with piping details.

AEROFIN HAS A TREMENDOUS ADVANTAGE in its LIGHT WEIGHT. AEROFIN weighs only 9% to 25% as much as the old-fasioned heavy heaters. AEROFIN SAVES A GREAT DEAL OF SPACE.

AEROFIN IS MADE OF NON-CORROSIVE METALS. This feature meets with universal approval.

THE INSTALLED COST OF AEROFIN IS GENERALLY LESS than that of cast-iron heaters and pipe coils. AEROFIN (completely encased) can be erected in the same number of HOURS as is required in DAYS to erect the heavy heaters. This means a great saving in erecting cost.

THE INSTALLATION OF AEROFIN WITH VERTICAL TUBES IS RECOMMENDED as this arrangement is less subject to errors of installation and operation. THE HORIZONTAL TUBE ARRANGEMENT is satisfactory when installed in accordance with our instructions and diagrams.

Write for catalog, instruction leaflet and service details.

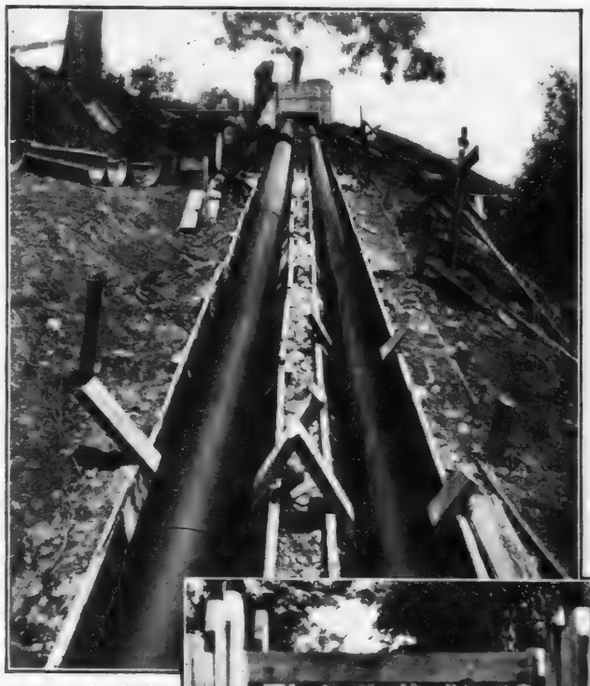
Aerofin is Sold ONLY by Manufacturers of Nationally Advertised Blower Heating Apparatus.

Overcoming difficulties

WHERE working conditions have been most difficult, the merit of the Johns-Manville Underground System of Insulation has been most apparent.

Up hill and down dale, through congested city districts, over streams, through quicksand and through rock and in the face of many other obstacles, installations of the Johns-Manville System for preventing radiation and loss of heat from pipes running underground, have revealed its inherent high quality and the skill and ingenuity of the men who are responsible for its installation.

JOHNS-MANVILLE, Inc.
292 Madison Avenue at 41st Street, New York City
Branches in all Large Cities
For Canada: CANADIAN JOHNS-MANVILLE CO., Ltd.
Toronto



12-inch high pressure steam main and 8-inch return climb a steep hill. The grade was brought up to cover after the installation.

Like the New York Subway, the Johns-Manville Underground System of Insulation does not always stay underground. At Cornell University it crosses a creek.

Quicksand and numerous springs made trench digging difficult here.

Through—
Electrical Materials
FOR
Utilities
Jobber
Contractor
AND
Dealer

JOHNS-MANVILLE

Underground System of Insulation

Warren Webster & Co., Camden, N. J., announces the appointment of Lucien J. White as district manager of its San Francisco branch office, 55 New Montgomery Street. The company also announces the opening of a branch office in Salt Lake City, Utah, with Rushby C. Midgley as district manager.

Home Appliance Corp., St. Louis, announces that the name of the corporation has been changed to Electrol Inc. of Missouri. Electrol Inc. of Missouri is a working corporation under the Delaware corporation, known as Electrol Corp. of America, a holding company. Officers of the new organization are: William T. Koken, president; L. L. Scott, vice-president; William R. Bush, vice-president; William Becktold, treasurer; Wendell Berry, secretary.

Crane Co., Chicago, is changing the location of its Kansas City branch office from 1324 Grand Ave. to Sixteenth St. and Grand Ave.

Pierce, Butler & Pierce Mfg. Corp., Oswego, N. Y., opened a new warehouse at 291 East Blackwell St., Dover, N. J., on June 1. L. R. Jacobus, who is in charge of the branch, is assisted by S. M. Gillen; both are of Dover.

Kellogg-Mackay Co., 1351 West Thirty-seventh Place, Chicago, has elected F. W. Fix, formerly treasurer of the company, to succeed the late O. V. Kellogg as president. The company is to erect a new warehouse at 2020-2024 Walnut Street, Kansas City, costing $150,000. The building is to be 75 x 104 ft. R. E. Bidwell is to be manager of that branch.

Heating Service & Supply Co., formerly at 169 N. May St., Chicago, has changed its name to the Heating Systems & Supply Co., and is located in large quarters at 107 W. Van Buren St., Chicago.

Standard Heater Co., Williamsport, Pa., in order that its corporate title may conform to the trade name of its product, will hereafter be known as Spencer Heating Co. The corporation will continue under the same ownership and managing control.

McCann-Harrison Corp., Cleveland, announces that J. Douglass Wood, M. E., formerly with Drying Systems, Inc., Chicago, is now with its sales division.

Ofeldt Gas Boiler Sales Corp., Chicago, distributors of Kane and Ofeldt gas fired boilers, announces the change of its name to Monarch Sales & Engineering Co. The organization, which will continue to distribute the Kane and Ofeldt gas fired boilers and appliances, also the original Gem flueless boiler, will remain at its present location at 363 West Erie Street, Chicago.

Pacific Boiler Sales Corp., Waukegan, Ill., has appointed Edward J. Lomasney consulting engineer for its Milwaukee sales office. Mr. Lomasney has been retained to augment the service in connection with Pacific boiler installations and operations, and will be at the call of engineers, architects and the trade.

Cecil R. Lambert Co., Inc., of Detroit, specialists in design, manufacture and installation of conveying and handling equipment, announces that in order to identify its products and service with its name, the latter has been changed to Mechanical Handling Systems, Inc. The company's facilities for service are being materially increased by additions to its plant and personnel, but there is no change in ownership or executive staff.

Federal Gauge Co., Chicago, has appointed Wallace C. Capen to handle its southwestern sales, with headquarters at 605 Claire Ave., St. Louis. Mr. Capen, who has been made a vice-president of the Federal Gauge Company, was the first president of the Oil Burner Manufacturing Association, and, until recently, vice-president of the Home Appliance Corporation, St. Louis.

Yeomans Brothers Co., Chicago, manufacturer of sewage ejectors and pumping machinery, has recently appointed the General Equipment Co., Lafayette

Spraco Filter Cell

WHY LET
—DUST RUIN—
WHAT
SPRACO
AIR
FILTERS
WILL
—PROTECT—

Look around you. Observe the interior of buildings equipped with Mechanical Ventilation but without Air Filters. What do you see? Black streaks around all grilles, dust and dirt deposited on goods and furnishings. Have you considered how much a small investment in **Spraco Air Filters** would save?

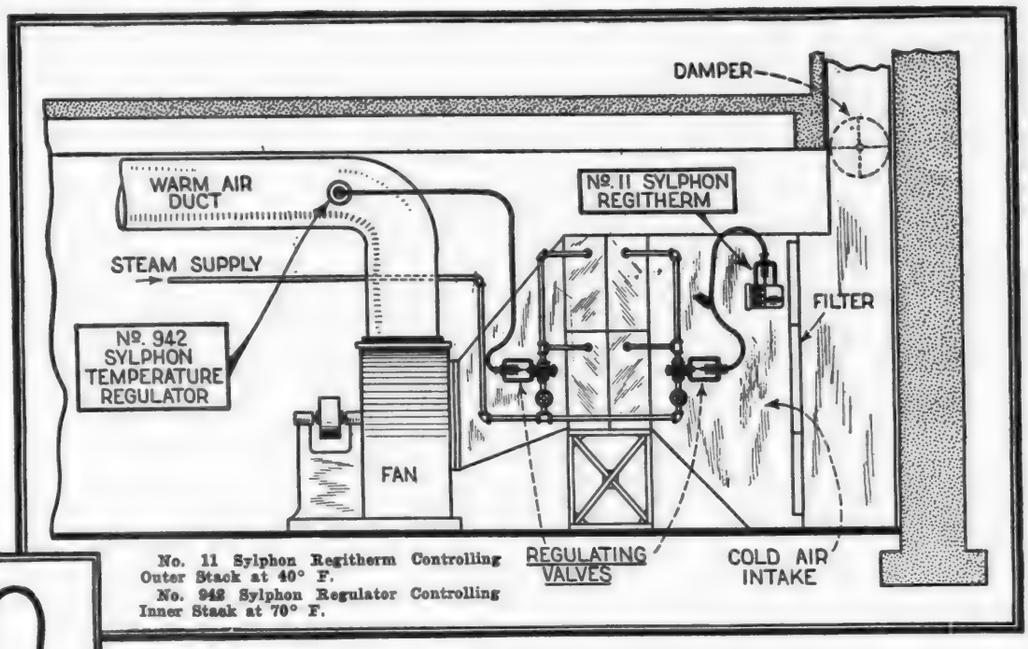
Send for Bulletin F-81

Spray Engineering Company
60 High Street
BOSTON, MASSACHUSETTS

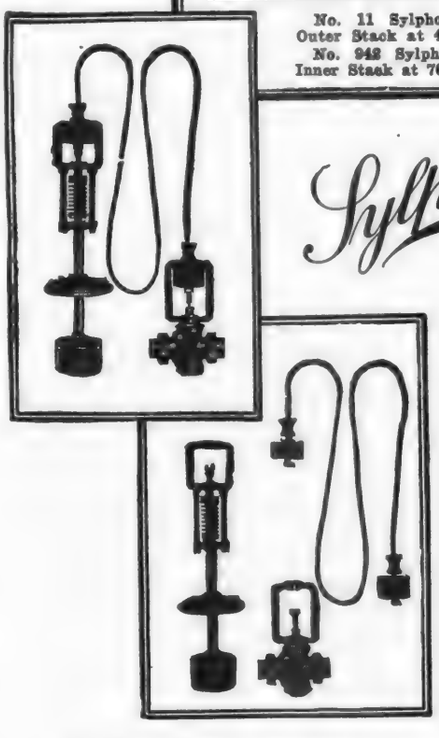
Air Washers
Cooling Ponds
Spray Nozzles

Air Filters
Strainers
Flow Meters

Here Is Dependable Automatic Control for Indirect Heating Systems in Buildings and Factories



No. 11 Sylphon Regitherm Controlling Outer Stack at 40° F.
No. 942 Sylphon Regulator Controlling Inner Stack at 70° F.



No. 942 Sylphon Temperature Regulator, assembled above, and unassembled below, showing how easily the transmission unit is detached or connected to the valve and thermostatic head by means of T-slot connections.

Sylphon Regulators, Easy to Install, Maintain Desired Temperatures

In the installation shown above, a No. 11 Sylphon Regitherm (set at 40° F.) controls the steam supply to the outer heating stack. Whenever the outside temperature falls below 40° F. the Regitherm automatically opens the steam supply to this stack, supplementing the No. 942 Sylphon Regulator which is installed on the inner stack and maintains the warm air supply in the duct at 70° F.

The three-part construction of these two Regulators makes installation an easy matter, because only one part has to be handled at a time.

The well-known Sylphon Bellows is the expansion unit in these instruments. Thus the power required for their operation is generated within the regulator. There are no delicate or complicated auxiliaries to get out of order. You can safely install these simple, sturdy instruments for they will work without attention season after season, automatically maintaining 70° F. heating conditions, no matter how much the outside temperature may vary.

Ask for Bulletin WR-102 or Catalog WTR-200 giving prices, dimensions, and many interesting detail drawings of installations.

This can be done hundreds of thousands of times—
AND NO APPRECIABLE LOSS OF FLEXIBILITY WILL DEVELOP IN THE ALL METAL SEAMLESS SYLPHON BELLOWS
Sylphon

Every genuine Sylphon bellows is drawn and formed seamless from a flat sheet of specially prepared metal, with folds or corrugations formed to provide the greatest strength and flexibility.

THE FULTON COMPANY KNOXVILLE, TENN.

ORIGINATORS AND PATENTEES OF THE SYLPHON BELLOWS

Sales Offices in: New York, Chicago, Detroit, Boston, Philadelphia and all the principal cities in the U. S.

European Representatives:
Crosby Valve & Engineering Co., Ltd.,
41-42 Foley Street, London, W. 1, England

Canadian Representatives:
Darling Bros., Ltd.,
120 Prince Street, Montreal, Canada

Arcade Building, Tampa, as its sales representative for central and southern Florida. The office of the General Equipment Company is in charge of Eugene F. Leger, treasurer, formerly with the selling organization of the Wheeler Condenser & Engineering Company, and the DeLaval Steam Turbine Company, and, until recently, manager of the district office of Goulds Pumps, Inc., Boston. H. L. Knowlton, formerly with the Goulds Pumps, Inc., is assisting Mr. Leger as sales engineer.

Westinghouse Electric & Mfg. Co., has appointed Francis Hodgkinson, for many years chief engineer of its South Philadelphia works, consulting mechanical engineer for the organization as a whole. The company has also appointed Roscoe Seybold, formerly manager of price statistics, assistant to F. A. Merrick, vice-president and general manager of the company.

Buckeye Blower Co., Columbus, announces that H. J. Murray became identified with its Chicago office on June 15.

New Corporations

Joseph Harrington Co., Harvey, Ill., a subsidiary of Whiting Corp., for the purpose of marketing the "King Coal" stoker. President, Joseph Harrington; vice-presidents, T. S. Hammon and R. H. Bourne; secretary-treasurer, R. A. Pascoe. Mr. Harrington was from 1900 to 1912 chief engineer for the Green Engineering Company, and later consulting combustion engineer, specializing in power plant design and efficiency. During the war he was a member of the United States Fuel Administration for Illinois. He is the designer and inventor of the Harrington stoker and the "King Coal" stoker. He is also an honorary member of National Association of Stationary Engineers, and a lecturer and contributor to the technical press.

Arctic Nu-Air Corp., of New England, Boston, capital of $50,000, to manufacture fans, ventilators and similar products. Incorporators: Henry G. Segal, David L. Shoolman and Joseph Shoolman, all of Brookline, Mass., and May C. Berman of Boston.

Ryan Heating & Plumbing Co., 403 Bradley St., Davenport, Ia., heating and plumbing the new 7-story hospital at the University of Iowa, Iowa City, Ia., for $222,358.

New Plant for John J. Nesbitt, Inc.

Work has commenced on a new office building, manufacturing and storage building, garage and boiler house which are to be erected at Holmesburg Junction, Philadelphia, for John J. Nesbitt, Inc., now of Atlantic City, N. J., manufacturer of portable unit ventilators. The office building will be 50 ft. by 74 ft., the manufacturing and storage building, 142 ft. by 183 ft.; the garage, 80 ft. by 40 ft.; and the boiler house, 28 ft. by 40 ft. The building will be divided into general offices, reception and conference rooms, private offices, manager's and bookkeeper's offices, fireproof vault, kitchen and lunch rooms and toilet rooms.

The manufacturing and storage building will be used in connection with the production of heating and ventilating apparatus. The main area will be used for general manufacturing purposes, with partitions to form spraying and drying rooms, an electrical shop, an experimental room, a carpenter shop and stock room.

The plant will be heated by direct radiation and by a special type of ventilating radiator units. The boiler house is to be equipped with two fire-tube boilers, with draft produced by a radial brick chimney 3 ft. 6 in. inside diameter, and 75 ft. high. A fuel-oil burning system will be installed under the boilers, with a fuel-oil storage tank situated so as to be filled from tank-cars on the siding adjoining.

Drawings and specifications of the building were prepared by the Ballinger Company, architects and engineers, Philadelphia and New York. Contract for the building work was awarded to Bowden Construction Company, Philadelphia.

Sustained Business Activity Reported in Pipe and Supplies Field

Trade conditions, reported at the seventeenth annual convention of the National Pipe and Supplies' Association at White Sulphur Springs, W. Va., June 1-3, indicate that 1926 will maintain, if not exceed, the record of previous years. In the wrought-iron pipe field, for instance, Harry F. Mattern, manager of sales for the Reading Iron Works, described business conditions as good with the future looking bright. H. W. Seymour, manager of sales for Crane Company, referring to the valve and fittings situation, declared that conditions are getting better every day, due to the help of the jobbers in all parts of the country.

M. J. Beirn, assistant general manager of sales for the American Radiator Company, who was called upon to discuss the boiler and radiator situation, said:

"During the first four months of the year we enjoyed a very satisfactory business and we believe 1926 will be a record year in building operations, which will create a demand for boilers and radiators. The first eighteen days of May showed an increase of 14% over the same period in 1925."

Mr. Beirn urged more attention to merchandising practices on the part of the wholesalers and contractors and proved a strong advocate of the installment plan of buying.

John J. Kennedy, of the National Tube Company, speaking on the steel pipe situation, declared:

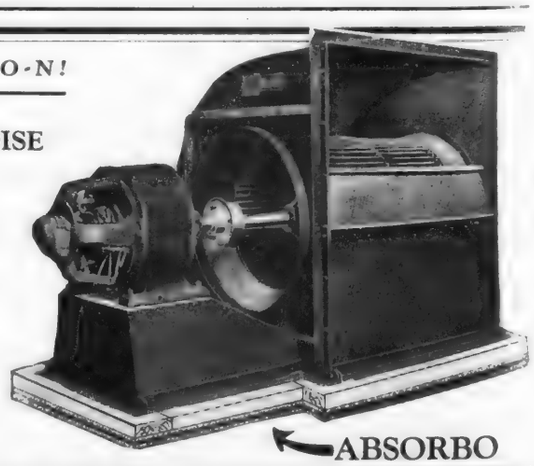
"Pipe business is good. The demand from the building industry has been good. The jobber is a necessary adjunct to the manufacturers' sales force and we are anxious to see you make money. Competition among jobbers for sales of pipe has been unhealthy during the past two years. The pipe business during the month of May has been the best in fifteen months."

The fact that heating and plumbing supply houses are not making more money was attributed to their mad

THERE IS NOTHING LIKE CORK TO ABSORB V-I-B-R-A-T-I-O-N!

"ABSORBO" ABSORBS VIBRATION AND NOISE
(Trade Mark)

The noiseless operation of fans and motors is of great importance. The illustration shows an arrangement which has proven satisfactory in minimizing the noise and vibration. A layer of 'ABSORBO' placed under the timber frame is the usual method for this type of machine.



Let Our Engineering Department Solve Your Problems

CORK FOUNDATION COMPANY
315 FIFTH AVENUE NEW YORK

Cutting cost three ways!

CUT down time-costs on radiator-installation and you net a bigger profit on the contract. There are three ways that Grinnell Column Radiator Brackets help you do that.

First—they reduce the delays caused by rough walls because they have only three points of contact.

Second—they require only one bolt to fasten them firm and secure.

Third—they can be set without extremely accurate, time-consuming measurements because of their wide range of adjustment—both vertical and horizontal.

Send for pamphlet giving illustrations, descriptions, dimensions of the various sizes in this sturdily made time-saver. Address Grinnell Company, Inc., 275 W. Exchange St., Providence, R. I.

GRINNELL

Fittings, Hangers, Valves, Pipe Bending Welding, Piping Supplies, Etc.

scramble for volume. It was pointed out, for instance, that the net profit of the wholesaler in 1906 averaged 8.96%. For 1925 this margin reached the low figure of 0.47%. It was brought out that there has been, in some cases, an overdevelopment of sales organization, the establishing of too many branch houses and too little attention to credit.

SURVEY OF JOBBING HOUSE SHOWS INCREASED BUSINESS

A survey made by Secretary McIlvaine, of 166 wholesale houses, covering their volume of business during the first four months of 1926, as compared with the corresponding period of 1925, showed that 78 firms reported an average increase volume of 30.8%, while 88 houses showed a decrease of 14.9%.

One of the resolutions passed at the meeting was that the term "jobber" be eliminated and the word "wholesaler" or "distributor" be substituted.

President M. W. Dennison was re-elected, as were First Vice-President H. W. Strong, Second Vice-President W. C. Hanson, Secretary-Treasurer George D. McIlvaine. The executive committee will be made up of J. J. McArdle, J. A. Vann, Francis J. Baker, M. M. Cochran, Isidor Weil, Leo M. O'Neil, W. M. Pattison and Murray W. Sales.

Plumbing and Heating Salesmen Hold First Annual Convention

A three-day meeting, May 27-29, at the Book-Cadillac Hotel in Detroit, marked the first annual convention of the National Association of Plumbing and Heating Salesmen. Among the notable addresses, was one by Jacob Soffel, of the George H. Soffel Co., Pittsburgh, on "The Importance of Selling Plumbing and Heating Material to the Consumer Exclusively Through the Plumbing and Heating Contractor."

Mayor John W. Smith, of Detroit, attended one of the sessions and expressed the city's welcome.

E. H. Blywind, president of the Republic Brass Co. of Cleveland, addressed the meeting, emphasizing the benefits that can be accomplished for the industry by the salesmen. He described the plumbing and heating business as one of merchandising, rather than one of peddling and pointed out the bright future which is facing the industry.

Milton L. Lissberger, president of Marks, Lissberger & Co., Inc., Long Island City, N. Y., declared that the weak link in the industry has been the salesmen and he urged mutual co-operation to improve the salesmen's status.

Other speakers were A. C. Brown, president of the Chicago Faucet Co.; George A. Moore, general manager of the Detroit Range Boiler and Steel Barrel Co., Detroit, who discussed "The Problem of Distribution in Plumbing and Heating Materials"; Fred F. Lorne, of the Lorne Plumbing and Heating Co., Detroit, whose subject was "What the Salesman Can Do to Help the Heating Contractor"; W. G. Cochrane, secretary and sales manager of the Detroit Brass and Malleable Iron Works of Detroit, and William G. Bergner, of the National Trade Extension Bureau.

President William G. Boales, of Detroit, was re-elected to that office. The other officers are: First vice-president, W. E. Carmichael, of New Jersey; second vice-president, Fred H. Schierendeck, of Minneapolis; secretary, William Weber, of New York; treasurer, C. W. Cope, of Philadelphia. Directors: R. J. Matti, Pittsburgh, and D. D. Reed, Indianapolis.

A Look Into the Business Future

Underlying economic factors in the business outlook were discussed by Henry A. E. Chandler, economist of the National Bank of Commerce, New York, in a speech delivered before the Illinois Bankers' Association, Springfield, Ill., June 17.

Mr. Chandler laid particular emphasis on the presence of two or three sources of new buying power, which have resulted from the accumulation of large shortages in important branches, including industrial construction and housing; increase in the standard of living, and in the revolution in our capital and credit position, which has supplied not only an abundance of funds for all normal needs of production and consumption, but also, an extensive credit, making possible much speculative enterprise. The answer to the question, he stated, as to why such a notable business recovery since 1921 has been possible in the absence of good buying capacity on the part of two of our best sources of business, is to be found in the extraordinary force of the new buying power.

Looking into the future, Mr. Chandler stated that the two questions which arise are:

1. Is the new buying power of a sufficiently permanent nature to assure us of a continuation of the present volume of business?

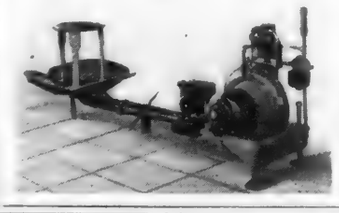
2. If not, what is the outlook for the full recovery of the buying power of the farmer and of our foreign customers?

Mr. Chandler gave an affirmative answer to the first question, basing his judgment largely on the wider distribution of income, incident to the war and post-war development, to the remarkable advances that have been made in technical efficiency and in the efficiency of our industrial organizations and management, to say nothing of the improvement in our transportation facilities. He felt that we must expect a reduction in this new buying capacity, which has arisen from high wages and large profits.

ANNUAL CATALOG 1925-1926 OF PURDUE UNIVERSITY, Lafayette, Ind., includes, in the description of its mechanical engineering course, the course in heating and ventilation, which is in charge of Professor Hotchkiss. Four semesters in all are devoted to this subject, the last semester taking up design, in which plans are designed for actual buildings, using either architects' plans or plans made by the student from his own survey of existing buildings. Complete specifications and estimates are made

The CHALMERS OIL BURNER

was among the pioneers in the oil burner industry and their present popularity is based on the permanent, satisfactory service they have delivered through the years.



Approved by Underwriters Laboratories.
Responsible Representatives will find the Chalmers Agency a profitable one.

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—the Greatest Efficiency Booster Ever Discovered

Men can't live without it!
They surely work better with it!

What is the annual cost of stale air to your business? You have never measured it, of course, but if you could see the staggering total on your balance sheet you would be genuinely amazed and alarmed!

Every man and woman in your establishment—yourself included—suffers a loss in efficiency because it is impossible without special equipment to provide fresh air in proper quantities all day long, the year around.

Drowsiness, "afternoon fatigue," headaches, mistakes, all kinds of minor illnesses—dulled brains and sharpened tempers—all of these are directly traceable to inadequate ventilation. We are all human; therefore we all need pure air and plenty of it.

Supply it—easily, efficiently and economically—with American Blower Ventilating Fans—carried in stock by leading electrical jobbers in all parts of the country.

American Blower Ventilating equipment is installed by Electrical and Ventilating Contractors everywhere.

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MECHANICAL ENGINEER WANTED—For heating and ventilating high-pressure piping, make plans and specifications, estimate, supervise. Established firm in Central New York. State age, experience, salary expected and give reference. Address Box 71, care of Heating and Ventilating Magazine.

MANUFACTURER'S REPRESENTATIVE—Manufacturer of complete line of fans, air washers and unit heaters desires recognized representatives on commission basis. Address Box 53, care of Heating and Ventilating Magazine.

District Representatives Wanted For Electrozone—SOME VERY GOOD TERRITORY IS STILL AVAILABLE FOR WELL-ESTABLISHED FIRMS TO SELL A COMPLETE LINE OF OZONE GENERATORS. OUR COMPANY WAS THE FIRST COMPANY TO MANUFACTURE A SUCCESSFUL VENTILATING OZONATOR AND TO-DAY WE HAVE THE MOST COMPLETE LINE OF OZONATORS ON THE MARKET. EACH TYPE OZONATOR IS DESIGNED FOR ITS PARTICULAR USE. WE MANUFACTURE THE ELECTROZONE VENTILATING OZONATOR, ELECTROZONE FURNACE OZONATOR, ELECTROZONE PORTABLE OZONATOR, ELECTROZONE INDUSTRIAL OZONATOR, ELECTROZONE SWIMMING POOL STERILIZER, ELECTROZONE FILTER STERILIZER UNIT FOR BOTTLERS, ELECTROZONE WATER STERILIZERS. IN REPLY STATE OTHER LINES HANDLED AND TERRITORY COVERED. ADDRESS THE AIR CONDITIONING & ENGINEERING CO., 2914 SOUTH JEFFERSON AVE., ST. LOUIS, MO.

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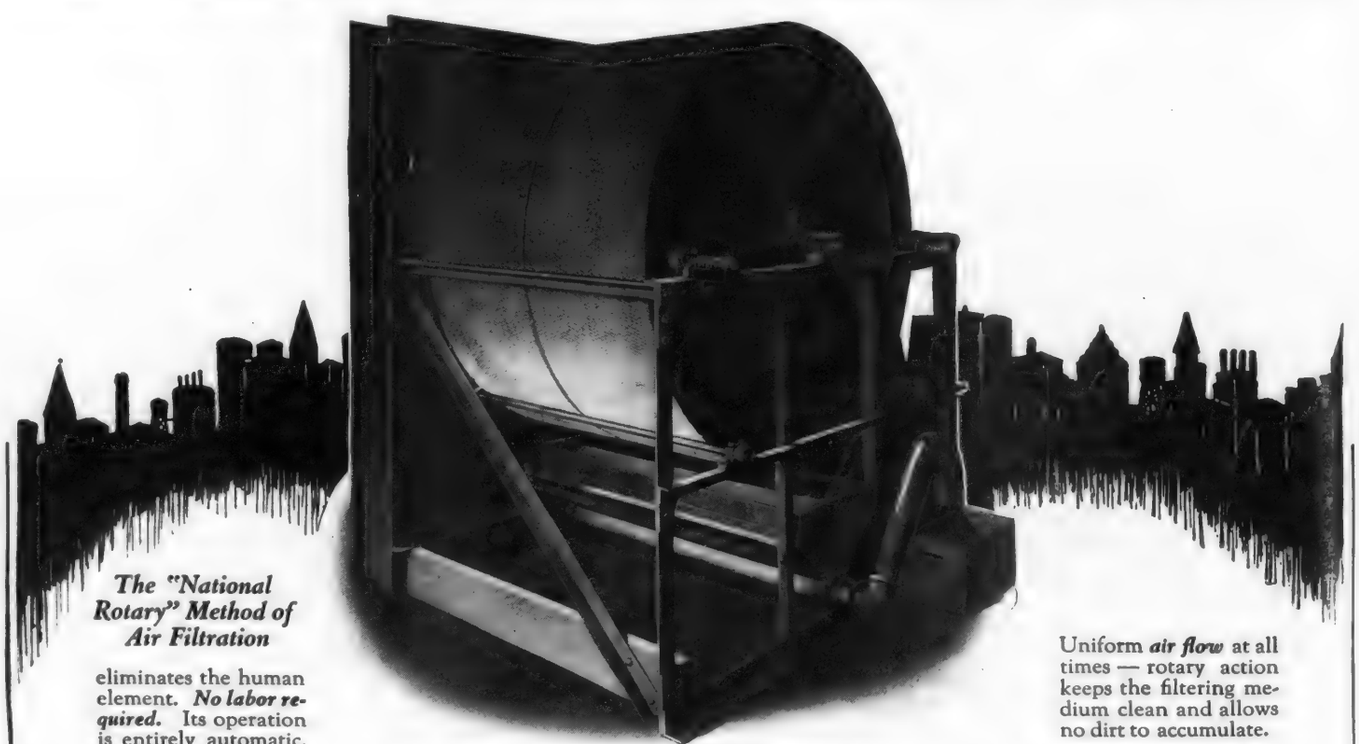

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eliminates the human element. ***No labor required.*** Its operation is entirely automatic. Its installation is simple.

Uniform ***air flow*** at all times — rotary action keeps the filtering medium clean and allows no dirt to accumulate.

Send for bulletin 30.

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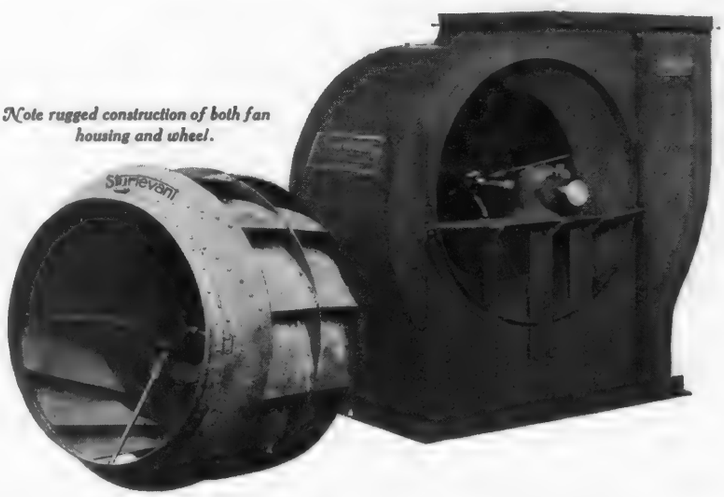
Sturtevant Silentvane

Cuts Operating Costs 25-30%



Note rugged construction of both fan housing and wheel.

The Silentvane's high efficiency cuts operating costs 25% to 30%. Its self-limiting horse power characteristic prevents motor overload and permits the use of a motor smaller than would be required for other types of fans. Hence, a considerable saving in first cost of motors. The Silentvane gives more dollar for dollar value than any other ventilating fan. It is built of the finest materials to give economical and dependable service. Its life is equivalent to the life of the building. Quiet operation and extraordinary freedom from trouble have popularized the Sturtevant Silentvane with architects and engineers. In construction, operation, and service the Silentvane is without a peer. Nothing has been left undone to make it the finest ventilating fan on the market—it's a quality product throughout.

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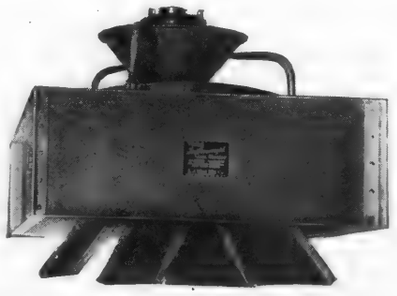
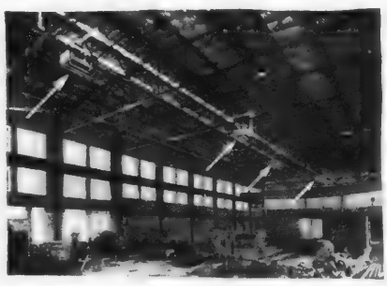
40 FEET FROM THE FLOOR.



Height is no bar to the successful operation of WING FEATHERWEIGHT UNIT HEATERS. The reason is found in the exclusive Wing policy of manufacturing four types to cover applications from very high to very low ceilings. A type for every need. Our engineering advice is without obligation.

The cut below shows an installation of four WING FEATHERWEIGHT UNIT HEATERS in a Railroad Car Shop.

These high ceiling type units are forty feet in the air. The owners have especially commented on the complete heating satisfaction obtained. Note the floor clear of heating equipment and the simple piping.



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Fans and Exhausters *Forced Draft Blowers*
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are being used throughout the nation to produce in Theatre and School Auditoriums the most comfortable conditions for audiences in these modern buildings.

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AUTOMATIC
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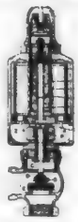
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give Dependable Service

These heaters are made in the U-tube and straight tube types; steel of flange quality used throughout. The heavy gauge seamless drawn copper tubes are expanded into rolled tube sheets.

Tanks and parts for all sizes carried in stock. Write us for further details.

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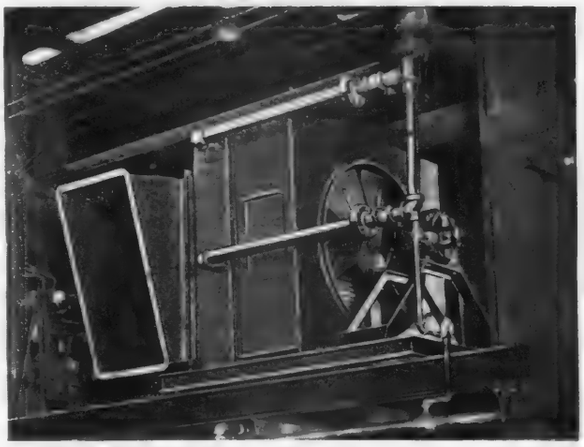
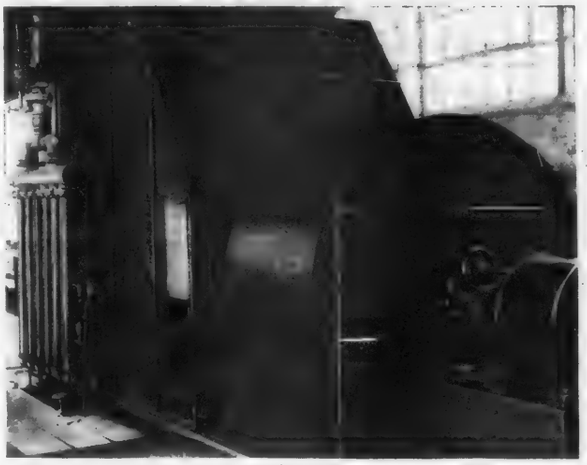
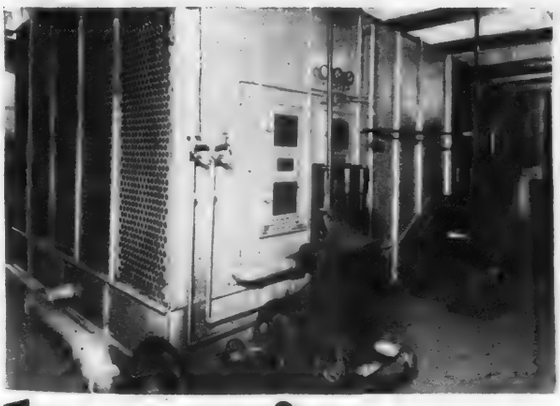
Use "Buffalo" equipment on every job







There is a real reason for using Buffalo equipment on every heating job—"Buffalo" has a complete line of heating and ventilating apparatus, it's priced right, and users testify to its quality.

We illustrate on this page an installation of a Buffalo Unit Heater. We make the famous low-cost high-efficiency "Breezo-Fin," one of the lightest, strongest, lowest priced and most effective unit heaters on the market. We also make direct-fired heaters for burning shavings, refuse, etc., as well as "Vento" and pipe coil units.

For factory heating under certain conditions, we build the "central fan" type of heating equipment shown in the second picture. This includes fan and steam heating coils, and is one of the oldest and most successful methods of indirect heating. Hundreds of contractors and users "swear by" Buffalo fan and heater systems.

For the very finest types of buildings, theatres, stores, schools, hotels, offices and a few factories, there is no method of heating and ventilating that compares in reliability, simplicity, effectiveness, and ultimate low cost with the "Buffalo-Carrier" method (lower cut) of supplying washed and tempered air, noiselessly, continuously and positively to any or all parts of the building. Buffalo fans and heaters, Carrier air washers and Buffalo pumps, all manufactured to work together, guarantee ideal results.

If you do not know the full story of Buffalo equipment, why not let us tell you about it NOW?

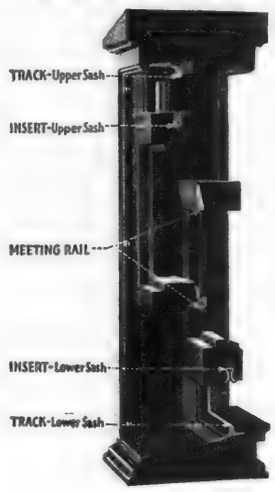
Buffalo Forge Company

480 Broadway BUFFALO, N. Y.

In Canada: Canadian Blower & Forge Co., Ltd.
Kitchener, Ont.

heating—ventilating

HIGGIN
ALL METAL WEATHER STRIPS



The patent *Insert* strip makes Higgin Weatherstrips extra draft-tight

Higgin Weatherstrips are the only all-metal strips with the self-holding spring flange **Insert** in the sash. This **Insert** is important.

It makes a perfectly draft-tight contact at every point. Swelling or warping cannot prevent accurate fit and closure.

Without the Higgin Metal Insert the wooden groove will wear, swell or shrink, causing sticking or allowing seepage of air through the apertures.

Higgin Strips are "Metal against metal all the way round." Higgin-equipped windows and doors always keep cold air out and warm air in, operate smoothly and easily, and never need refitting.

HEATING ENGINEERS! You can safely guarantee a definite heating efficiency for your equipment when Higgin All-Metal Weatherstrips are installed. They keep all the cold air out and all the warm air in. They never lose their close fit by warping or shrinkage of frames. Every job is installed by trained Higgin men and guaranteed by the Higgin organization. Recommend Higgin All-Metal Weatherstrips to your customers.

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RADIATOR HANGER

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5 Reasons

Why More Than 750 Nationally Known Concerns Have Adopted Ilg Unit Heaters

1 Low Power Costs: The all-important feature of the ILG Unit Heater is the fact that the air is drawn over the heating coils at very low velocity and discharged at high velocity, which insures minimum power consumption and maximum heating capacity.

2 Patented Adjustable Deflector: A patented adjustable deflector controls the placement of the heat waves at their source. As the air at the breathing line warms, the deflector can be raised to allow the heat waves to straighten out, easily reaching a distance of 50 to 60 feet.

3 No Floor Dust: There are no drafts, or circulating of floor dust for the reason that ILG Unit Heaters take the air horizontally, at low velocity, seven to eight feet above the floor; at the same time delivering, spreading and holding the tempered air at the breathing zone.

4 No Floor Restrictions: For the same reason, the efficiency of ILG Unit Heaters cannot be impaired by floor obstructions, and the action of the Unit is the same whether it is supported on the ceiling, sidewall or floor.

5 Perfect Ventilation: In warm weather ILG Unit Heaters can be used for cooling by operating the fans without steam or hot water in the coils. If connected with the outside air through the sidewall or roof, perfect ventilation is secured without any floor dust. Every ILG Unit Heater can be easily changed to a ventilating unit by connecting through roof or sidewall.

Illustrating graphically the fundamental principle of ILG Unit Heaters—showing how the action of the fan draws the live air into the cabinet, where it passes over the heated coils at low velocity and is tempered and then discharged at high velocity. **Note how the ILG patented deflector directs the heat waves to the floor.**

HIGH EFFICIE... TRADE ILG MARK ...VENTILAT... MACHINERY

Unit Heaters Have Established a Remarkable Record *for* Efficiency

COMPLYING with all the laws of scientific air circulation, the ILG Unit Heater represents a new engineering principle in blast heating which meets with the most exacting specifications of modern industry, and defines economy and efficiency in the broadest sense of the word.

The Morton Salt Co., Case Plow Works, Crane Co., Montgomery Ward & Co., and more than 750 other nationally known concerns have installed ILG Unit Heaters. Today there are more than 8,000 units in operation, one third of which are repeat orders.

Any spacious factory, warehouse, hall, garage, gymnasium, etc., can be heated more quickly and better with one or more ILG Unit Heaters than with direct radiation, and the fuel consumption is largely measured by the temperature maintained during the actual working period.

Send for the new Ilg Unit Heater bulletin of special interest to Engineers, Architects and Contractors, containing numerous illustrations and data of unusual value to every man who wants the facts, figures and evidence. Sign and mail the coupon.

ILG ELECTRIC VENTILATING CO.
2858 North Crawford Avenue : - : Chicago, Illinois

C O U P O N

Please send me a copy of your new Illustrated Bulletin, featuring the ILG Unit Heater and showing numerous photographic views of interesting installations.

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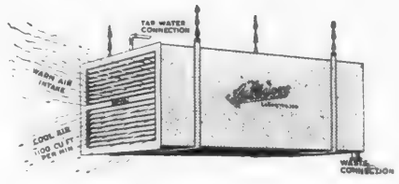
COOL!

The Aerodore
GAMES SLAYTER SYSTEM



The Aerodore cools, washes out dust, and odors, controls humidity.

Any home, office or kitchen can be kept below 80° in the hottest weather.

Simple in construction, operated entirely by city water, no electrical or other connections necessary.

Write today for descriptive folder.

Announcing "Slayter Unit Heat"

A combined Oil Burner, Warm Air Furnace, Unit, which has been under development for five years. (Inquiries solicited.)

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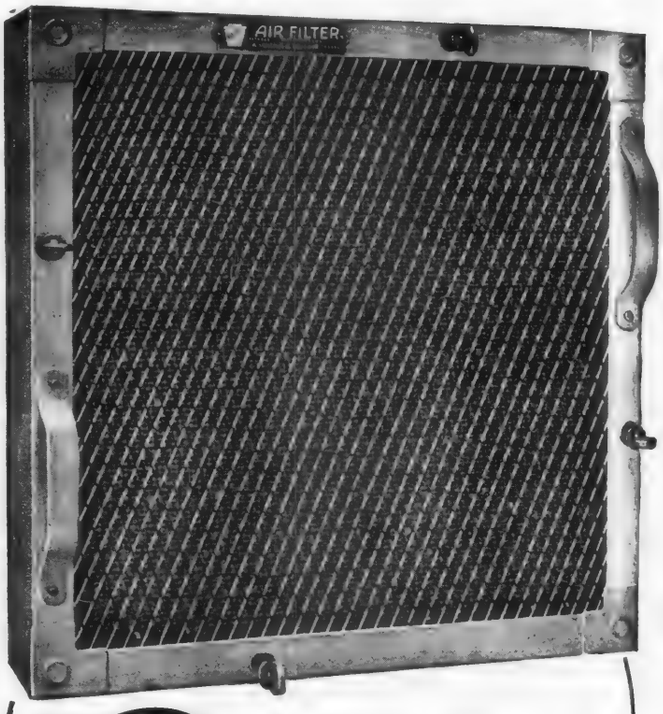

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Pre-eminence!

Dominant in the ventilating industry is the TURTLEBACK Air Diffuser—an improved floor ventilator, easily installed beneath the seats of theatres, schools and similar types of buildings; simply adjusted and locked rigidly in place by the center set screw.

Notches of 1/16 variations provide close regulation. Lack of obstruction allows the free flow and distribution of air.

The consulting engineer recommends inclusion of TURTLEBACKS in the architect's specification of ventilating equipment. The architect approves them. ***Write for Illustrated Catalogue***

VENTILATING PRODUCTS CO.
Not Inc.
2800 Cottage Grove Avenue, CHICAGO, ILL.

2000 Cubic Feet of Heated Air per Minute

—wherever you want it!

SIMPLY loosen the top and bottom union connections of the Modine Unit Heater, turn the heater in the direction where heat is most needed, tighten the unions—and you are all set for a constant delivery of 2000 cubic feet of heated air per minute, *right where you want it!* The union connections serve as swivels — there are no braces, brackets or permanent mountings required to hold the heater rigidly in any one, fixed position.

No other steam or hot water unit heater has this directional advantage, which is further supplemented by the adjustable deflector which throws the heat downward at any desired angle within 60 degrees. No other heater suspends from an overhead feed line. No other unit heater weighs so little (125 lbs.) and occupies such a small space (4½ cubic feet), permitting "drop suspension" installation. No other heater delivers so great a volume of heat per unit of weight (163,000 B. T. U. per hour at 60°).

Write for Bulletin "A" which describes this revolutionary industrial heating system in detail.

MODINE MANUFACTURING COMPANY
Heating Division ThermModine *Racine, Wisconsin*

The illustration shows how simple it is to DIRECT THE HEAT from the Modine Unit Heater WHERE NEEDED — toward a bad door or window, lathe, work benches, etc. One man with a wrench does it in a few minutes' time.

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UNIT HEATER
FOR STEAM OR HOT WATER HEATING SYSTEM

MUELLER
· Direct-Fired · Forced Air Unit

for Industrial Heating

COMPARED to elaborate steam systems it is more economical in first cost and maintenance, more quickly responsive and subject to direct control. Has the additional advantage of ventilating while it heats. For heating Factories, Foundries, Large Buildings, Offices, etc., the Mueller Direct Fired Forced Air Unit Heater has these advantages:

1. Direct fired unit. No danger of freezing, breakages or shut-downs.
2. Mueller Double Radiator self-cleaning furnace with extra large area of direct heating surface and scientifically proportioned humidifier.
3. You don't need a licensed engineer to run it.
4. May be installed in space to be heated, in single units or batteries, or in adjoining room, conveying warm, moist air through ducts.
5. Automatic electric fan maintains a constant pressure on heater, delivering a large volume of air at a satisfactory temperature.
6. May be used for ventilation, using outdoor air instead of recirculating heated inside air.
7. Reversible cowl equipped with two warm air outlets, mounted on pivot collar, allows introduction of air into room at any desired angle.

Write for descriptive literature and let our engineering department confer with you regarding your heating requirements.

L. J. MUELLER FURNACE CO.

Established 1857

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Heating Systems of All Types

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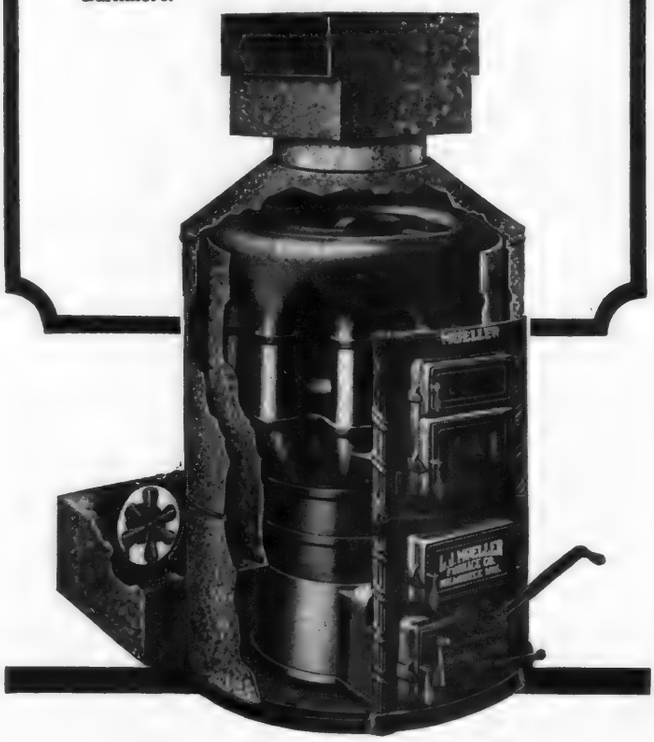

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Any Size

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HIGH STATIC PRESSURE

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Catalogue "H V" upon request

De Bothezat Impeller Co., Inc.

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Wrought Iron Adjustable

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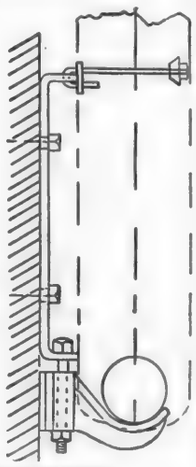

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No. 9 Bracket for Legless Column Radiation

Convenient—Safe—Durable

Used in buildings where the best equipment is specified, and besides being convenient, safe and durable they are easily erected, adjustable, inexpensive, sanitary, and invisible after erection.

FIT ANY MAKE OF WALL RADIATOR

Send for descriptive booklet and trade discount

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Architect—J. C. Llewellyn Co., Chicago, Ill.
Associate Architect—Chas. L. Troutman, Evansville, Ind.

Heating Contractor—
Gottman & Weber, Evansville, Indiana

This New School Building is Now Being Equipped with Buckeye Heatovents

ARCHITECTS and builders everywhere are enthusiastic about the appearance of the Buckeye Heatovent.

It is finished with the same care and workmanship as any fine piece of furniture or expensive automobile. The Buckeye Heatovent, unit system of heating and ventilating, is made in any finish and will harmonize with the interior of your particular building.

Upon request we will send you an illustrated booklet giving full information about the Buckeye Heatovent.

Buckeye Heatovents incorporate the latest and best engineering principles and are constructed of the very highest class materials and workmanship. These features, together with that intangible asset "Buckeye Service" insure your clients against poor ventilation and future repair bills.

Full description and detailed drawings are to be had in our data book for architects and engineers, available on request. But our complete service includes, also, that of co-operation on the part of members of our engineering staff, who will consult with you on your heating problems.

Our new catalog is now ready. Write for your copy now.
Any of our Branches can supply you.

THE BUCKEYE BLOWER CO.

COLUMBUS, OHIO

BRANCH OFFICES:

216 Bona Allen Bldg., Atlanta, Ga.
2126 Edmondson Ave., Baltimore, Md.
321 Jackson Bldg., Buffalo, N. Y.
301 Rose Building, Cleveland, Ohio.
401 Transportation Bldg., Chicago, Ill.
1226 California St., Denver, Colo.
400 Penobscot Bldg., Detroit, Mich.
3115 N. Central Ave., Indianapolis, Ind.
250 Columbia St., Detroit, Mich.
1011 Pioneer Trust Co. Building, Kansas City, Mo.
416 Essex Bldg., Minneapolis, Minn.
1400 Broadway, New York, N. Y.
321 Bulletin Bldg., Philadelphia, Pa.
709 Columbia Bank Building, Pittsburgh, Pa.
Fales Building, Seattle, Washington.
226 Kirk Ave., Syracuse, N. Y.
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Electrozone Ozonators

HILLS BROS., SAN FRANCISCO, CALIFORNIA
BUILDING EQUIPPED WITH ELECTROZONE OZONATORS
G. W. KELLAM, ARCHITECT
HUNTER AND HUDSON, ENGINEERS

The installation of Electrozone ventilation cuts down fuel cost and guarantees pure, invigorating air at all times, regardless of outdoor conditions.

Manufacturing exclusively
ELECTROZONE Ventilating Ozonators
ELECTROZONE Furnace Ozonators
ELECTROZONE Portable Ozonators
ELECTROZONE Water Sterilizers
ELECTROZONE Industrial Ozonators

The Air Conditioning and Engineering Co.
2918 S. Jefferson Ave., St. Louis, Mo.

GRIP-TITE
E-Z DAMPER
FIXED TOP

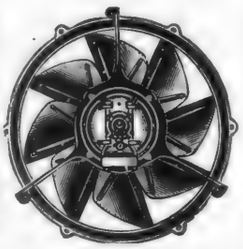
MUSHROOMS
CAST IRON

Intended for DeLuxe Theaters where expense is a secondary consideration.
Looks the Same—Much Simpler to Install

ÆOLUS DICKINSON CO.
3336-44 So. Artesian Ave., Chicago

JAMES M. SEYMOUR
Established 1888
Lawrence St., Mechanic St. and Kirk Place,
NEWARK, NEW JERSEY

AUDITORIUM FANS, 36" to 120" to fit any square opening. SEYMOUR FANS sold subject to substantial discount. Furnished with suitable pulley or coupling for direct connection TWIN FANS include shafting and center bearing.
Special Fans for Cooling Towers, Heating Systems, Induced Draft, Forced Draft, Dry Rooms, Dry Kilns.



SEND for BULLETINS, PRICES, and DISCOUNTS

SEE OUR DETAILED DATA IN ASH&VE GUIDE

MANUFACTURED WEATHER
makes
"Every day a *good* day"
Humidification · Dehumidification
Heating · Ventilation · Purification
Drying

Carrier
Engineering Corporation
750 Frelinghuysen Ave. Newark, N. J.
Boston Cleveland Chicago New York Philadelphia Los Angeles Kansas City

SEE OUR DETAILED DATA IN ASH&VE GUIDE

Pecco Unit Heaters (chosen after exhaustive investigation and tests) installed in Pevely Dairy Co. garage, St. Louis—serving 300,000 cu. ft. of open building space. Following this installation, six additional units were ordered for different plants for heating and drying purposes.

This external view shows some Pecco Unit Heater features. Note that the cold air intake fan is located where it belongs—near the floor at the cold air level. The Pecco fan is provided with a large number of special-shaped blades which are closely spaced and so pitched that the fan, when revolving at slow speed, permits delivery of a maximum volume of air. The fan "scroll" bottom (underneath the fan and not visible in the illustration) assures perfect "stream line" air distribution.

The Correct Heating Principle

Pecco Unit Heaters are uniformly effective because their design follows the fundamental laws of aerodynamics. They are built to heat all the air in the working zone in the building to the proper temperature. This is accomplished by (1) placing the cold air intake at the cold air level, (2) placing the warm air outlet at the warm air level, and (3) providing uniform air distribution by *recirculation* of all air in the open building space.

Mechanically, every detail of Pecco construction follows the latest approved practices and includes, in many instances, structural features that have been developed exclusively by Pecco.

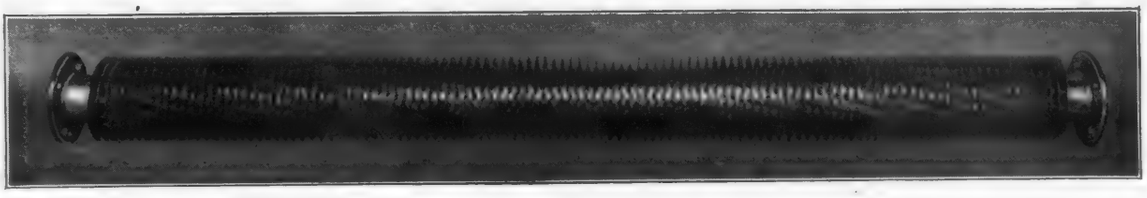
Pecco Unit Heaters have the unqualified endorsement of many users in a wide variety of industries and conditions throughout the United States. Write for details.

PECCO, INC., 2980 North Market St., St. Louis, Mo.

PECCO UNIT HEATERS

"They Keep The Whole Place Warm"

Figure on finned tubes



SCHUTTE KOERTING

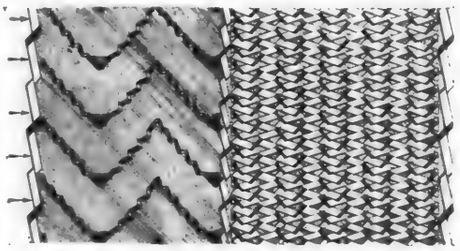
RADIAFIN TUBES
for heating or cooling air

have 6 to 10 times as much surface as plain tubes of same size
6 sizes—¾" to 3"—lengths up to 15 feet—plain or flanged ends
—with or without headers.

The radial fins insure maximum heat transfer

These tubes will be on display in Machinery Hall at the Sesquicentennial

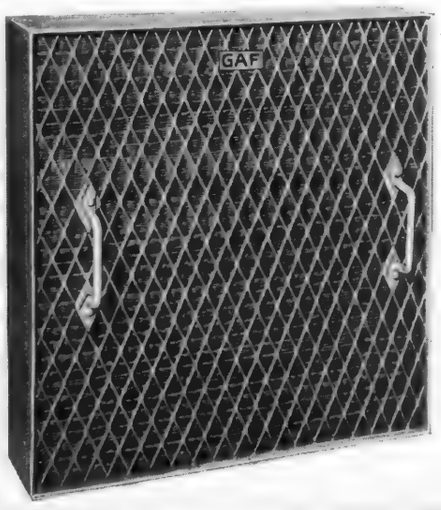
SCHUTTE & KOERTING CO., 1153 Thompson St., PHILADELPHIA, PA.



Section thru General Air Filter Cell.

FIRST STAGE—Consists of continuous and overlapping baffles. Baffles form troughs that hold oil. Removes all coarse dirt and ¾ by volume of all the dirt.

SECOND STAGE—Only the fine dirt enters this stage and is caught on sticky oil coated surfaces of densely packed special expanded metal. Will not clog.



The GENERAL Air Filter

A new filter design originated and developed by engineers who have specialized in this class of work for many years.

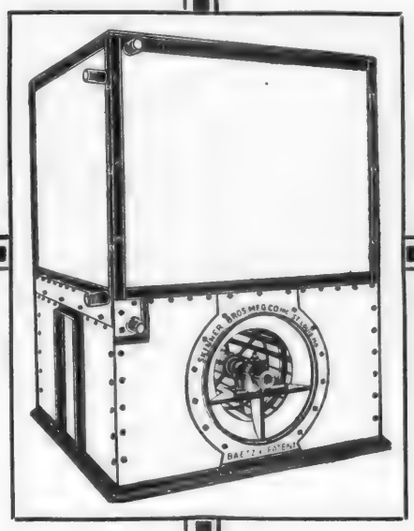
Scientifically tested in a special laboratory equipped with air testing apparatus, developed by the U. S. Bureau of Mines—in the presence of leading heating and ventilating engineers.

Approved by these engineers and specified by them for installation in important buildings.

Ease of cleaning and low average resistance are big outstanding features.

You are invited to visit our laboratory. We will make any test you may desire. Consult us freely on your requirements. Write for Bulletin.

General Air Filters Corp.
MANUFACTURERS
Air Purification Equipment
110 WEST 42ND STREET NEW YORK CITY



Backing up your judgment with dependable performance

You need fear no embarrassment because the equipment failed to come up to expectations, if you recommend

Skinner Bros. Steam Coil Heaters

Not only will the heaters prove themselves fit for long, efficient service, but the cooperation of the Engineering Department of the Manufacturers is your guarantee that there will be nothing but expressions of satisfaction after the installation is completed.

Buildings that are considered difficult to heat—large proportions of glass, huge volumes of cold air infiltrating from out of doors—monitor or sawtooth type—such are among the classic examples of what Skinner Bros. Steam Coil Heaters can do in effective and economical heating.

There is a Skinner Bros. Direct Fired Unit for use where steam isn't available.

Large factories in St. Louis and Elizabeth, N. J., assure delivery as desired.

Branches and sales offices in charge of competent engineers in principal cities place within reach every possible cooperation you may wish.

SKINNER BROS. MFG. CO., INC.

The Pioneer Manufacturers of Unit Heaters

Home Office 1404 S. Vandeventer Ave., St. Louis
Eastern Office 1014 Flatiron Bldg., New York

Baltimore	Detroit	Philadelphia
Boston	Indianapolis	Pittsburgh
Buffalo	Kansas City	Seattle
Chicago		Spokane
Cleveland		Washington

Skinner Bros. Steam Coil Heaters are recognized as leading equipment for heating and air conditioning—

Automobile Factories
Candy Factories
Creameries, Dairies, Milk Plants, Condensories
Dye Houses
Foundries
Furniture Factories
Garages and Repair Shops
Laundries
Packing Plants
Printing Shops
Paper Mills
Railway Shops
Shoe Factories
Soap Factories
Stone and Marble Works
Textile Mills
Woodworking Shops

and thousands of miscellaneous factories, mills and shops.

Honeywell 15-day thermostat equipped with dependable jeweled-balance movement clock and high grade thermometer.

You May Place Absolute Confidence in HONEYWELL Temperature Regulators

It is no small advantage to be able to sell your heating plant with perfect confidence in the automatic temperature control with which it is equipped.

With HONEYWELL you may know definitely in advance that it will function—with certain positive automatic control—continuously, for an indefinite period;

—that the householder will not be subjected to the annoying necessity of special service attentions;

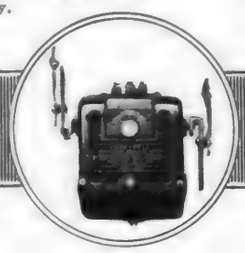
—that, as a matter of fact, HONEYWELL will effect a more satisfactory operation of your installation, bringing to it a new degree of efficiency, economy and safety.

In this light HONEYWELL becomes not merely essential equipment but a distinct sales asset that you cannot afford to discount.

It is the reason why the complete HONEYWELL High-Low System of Automatic Control is being adopted so generally by the industry.

Of the important domestic oil burners listed as standard by Underwriters' Laboratories, Inc., a majority is equipped with HONEYWELL *controls. The leading manufacturers of heating boilers recommend* HONEYWELL *exclusively.*

The Honeywell electric regulator motor—an amazing achievement in utter simplicity.



The Honeywell Heating Specialties Co.
Wabash, Indiana

Vapor Heating

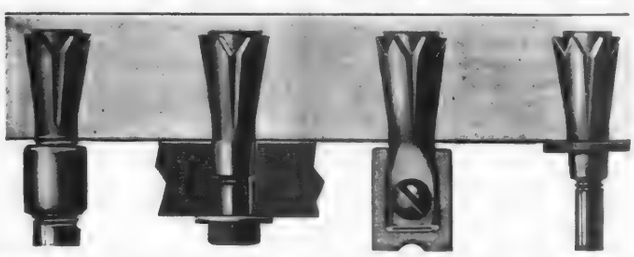
assurance doubly sure when tied to the boiler with a

Wiley Safety Vent Vapor Regulator

Write for your copy of booklet describing the Wiley line of vapor heating specialties.

peerless quality product manufactured and sold exclusively by

The Simplex Heating Specialty Co.
(INC.)
Lynchburg, - Va.



Phillips Self-drilling Expansion Shells

For fastening all types of hangers to concrete ceilings, side-beams, columns and walls, and for bolting timbers and other equipment to concrete and stone.

Installing Self-drilling Shells in Concrete

Every shell is a drill and makes its own hole, thus eliminating drill trouble and expense.

A new sharp drill for every hole and a smaller hole per given size bolt reduces labor cost of installing to absolute minimum.

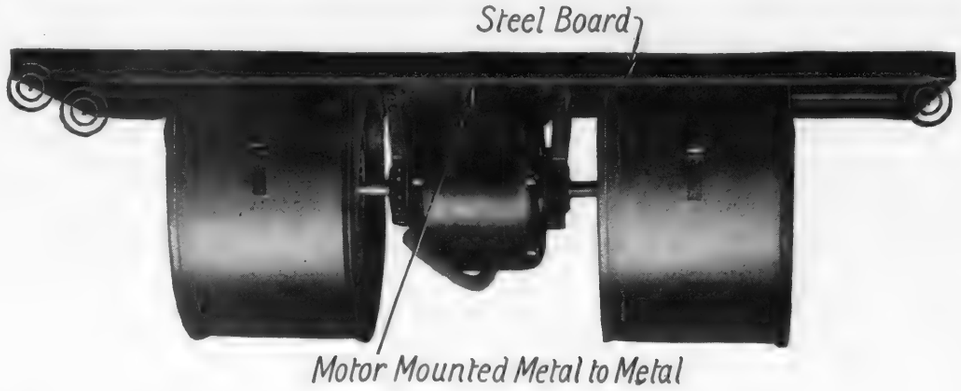
A perfect fitting hole and the enlargement of shell and hole at extreme bottom insures reliability and better workmanship.

Quickly installed with the Phillips Spring Hammer, or with special hand chucks.

Ceiling with Phillips Spring Hammer Drill

Manufactured by
PHILLIPS DRILL COMPANY
1537 Cortland Street CHICAGO, ILL.

Universal Heating & Ventilating Unit



Quiet-Operating Single-Phase Alternating Current Motors

Are Now Available in the *Universal Heating & Ventilating Unit*

As a result of the development of a quiet-operating single-phase motor in combination with the three-point lead mounting feature of the *Universal* Heating and Ventilating Unit we can now supply quiet-operating motors wound for any character of current. The use of a motor-generator set is no longer necessary.

This big step forward is fully described in our new publication No. 207, which will be furnished direct or through the nearest American Blower office.

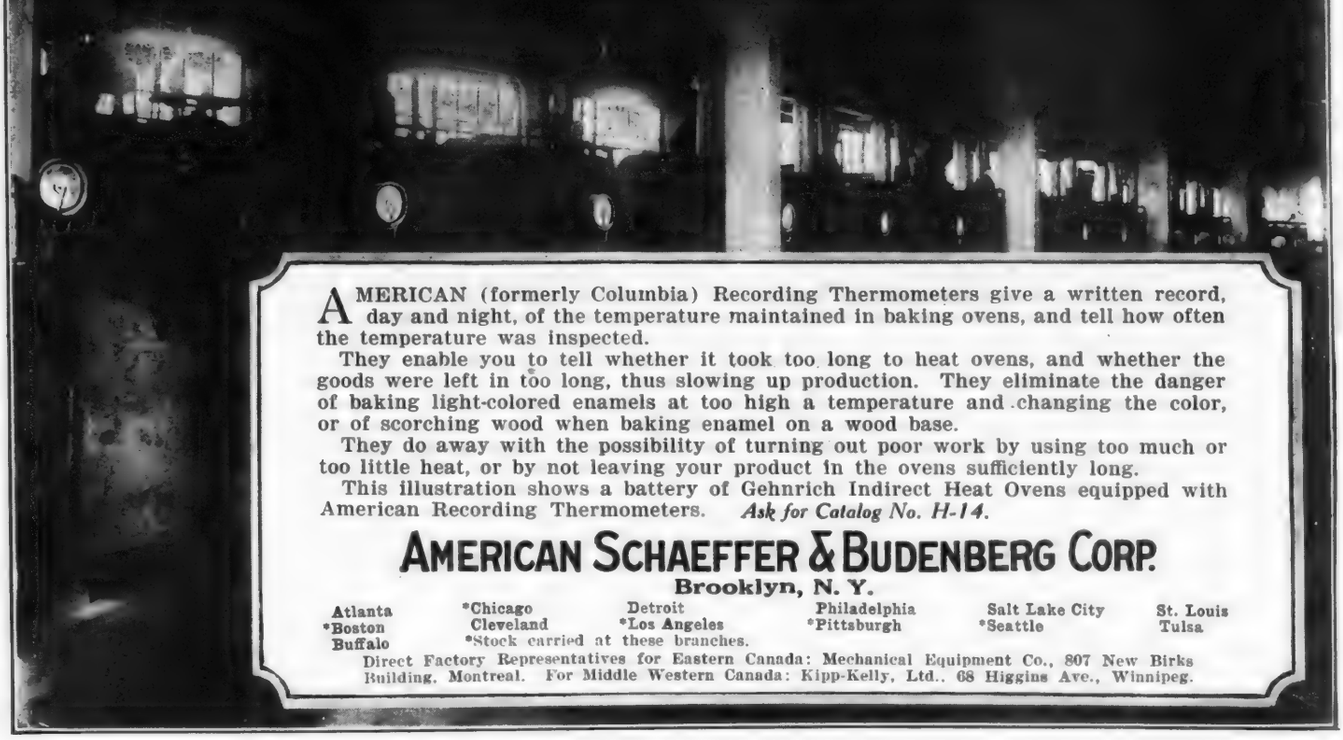
John J. Nesbitt, Inc.

213 N. Vermont Ave.

ATLANTIC CITY, NEW JERSEY

405 Lexington Ave.
New York City

AMERICAN Recording Thermometers on Paint and Enamel Ovens



AMERICAN (formerly Columbia) Recording Thermometers give a written record, day and night, of the temperature maintained in baking ovens, and tell how often the temperature was inspected.

They enable you to tell whether it took too long to heat ovens, and whether the goods were left in too long, thus slowing up production. They eliminate the danger of baking light-colored enamels at too high a temperature and changing the color, or of scorching wood when baking enamel on a wood base.

They do away with the possibility of turning out poor work by using too much or too little heat, or by not leaving your product in the ovens sufficiently long.

This illustration shows a battery of Gehnrich Indirect Heat Ovens equipped with American Recording Thermometers. *Ask for Catalog No. H-14.*

AMERICAN SCHAEFFER & BUDENBERG CORP.

Brooklyn, N. Y.

Atlanta, *Boston, Buffalo, *Chicago, Cleveland, Detroit, *Los Angeles, Philadelphia, *Pittsburgh, Salt Lake City, *Seattle, St. Louis, Tulsa

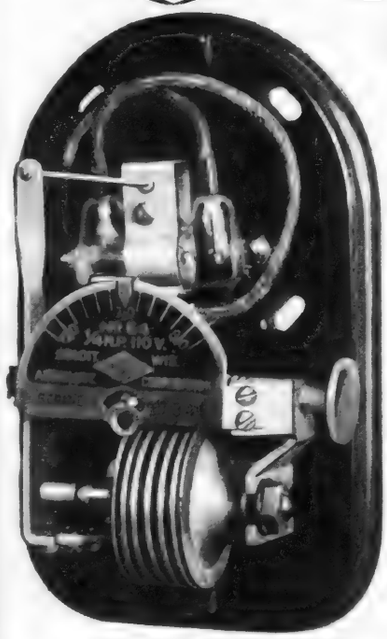
*Stock carried at these branches.

Direct Factory Representatives for Eastern Canada: Mechanical Equipment Co., 807 New Birks Building, Montreal. For Middle Western Canada: Kipp-Kelly, Ltd., 68 Higgins Ave., Winnipeg.

CON-TAC-TOR

THERMO-SWITCH

Practical
Simple
Safe



High Voltage Switches Motor Without Relay.

For
Oil Burners
Unit Heaters
Forced Draft
Coal Burners
Etc.

A complete line of Automatic High Voltage Controls listed in Bulletin O-7

ABSOLUTE CON-TAC-TOR CORPORATION

BELOIT, WISCONSIN

Little Giant Radiator Hangers

One bolt, adjustable hangers, for wall-hung radiation, that are distinctly superior in workmanship and materials.

Little Giant Radiator Hangers are made for use on wall and double wall radiation, and for 1, 2, 3, and 4 column radiation, as well as the Corto, Aero and Capitol Radiator. They are so constructed that they will stand any stress or strain.

The Hanger plate is made of Boiler Plate Steel. The Foot Piece and Back Plate are of malleable iron cast in one piece. No cast iron is used.

Little Giant Hangers allow for both vertical and horizontal adjustment. They hang with but one anchor bolt and are not visible after being installed.

Distributed by United States Radiator Corporation

Sold by all Leading Jobbers

Little Giant Mfg. Company

1927-31 Nicollet Ave., Minneapolis, Minn.

Automatic Air Filters, of *course!*

But which?

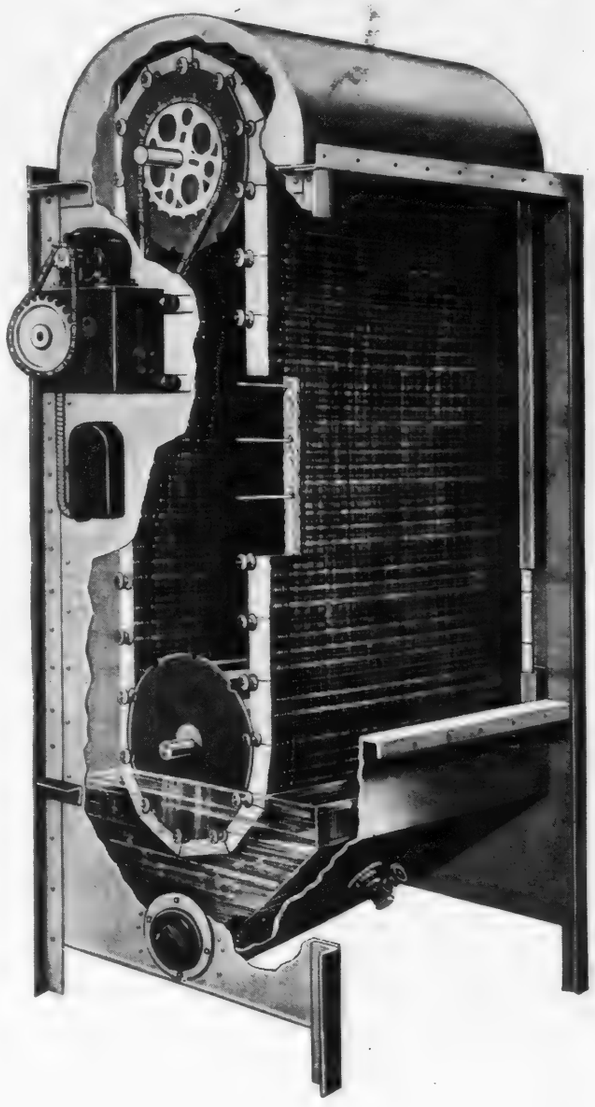
The original **Phoenix** Automatic *Constant-Effect* Air Filter has forced the hurried contrivance of other mechanical filters.

We suggest that you cannot afford to specify any but **Phoenix** because;

Phoenix is the *original* automatic air filter, designed initially as an automatic device to meet the essential requirement of dependable constant-effect, at minimum operating expense.

Phoenix has a proud service record of more than eight years and is now furnishing more than five million cubic feet of clean air per minute.

In the **Phoenix,** the die-stamped metal plates forming the surfaces which carry the viscous film are scientifically designed to afford the maximum possible air cleaning effect, not only, but to insure complete cleaning of the surfaces themselves when immersed in the fluid bath. This design, the result of years of intensive development, is exclusive to Phoenix.



Compare the performance!

Complete Descriptive and Data Bulletin on request

AIR FILTER DEPARTMENT

DRYING SYSTEMS, INC.

Drying and Air Conditioning Equipment

OFFICES, SHOPS AND LABORATORIES

1800 FOSTER AVENUE

CHICAGO, ILLINOIS

50 Church St.
NEW YORK

324 Rialto Building
SAN FRANCISCO

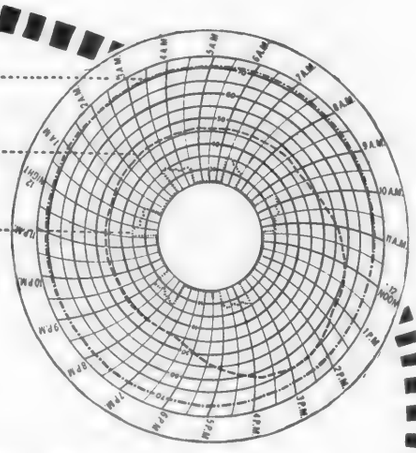
2011 Park Ave.
DETROIT

Offices in Principal Cities—Consult Telephone Directory

Hornung's "Master" Control Valve

CENTRAL STATION & INDUSTRIAL HEATING & LIGHTING — JCH

Do You Heat "All Outdoors"?



It is safe to say that except in extremely cold weather at least as much heat from Central Stations is thrown out of windows as is used to warm interiors.

The only way to correct this condition is to control the volume of heat *supplied*, in direct proportion to the amount *needed*.

Hornung's Master Control Valve is doing this in hundreds of buildings. It automatically cuts off the heat supply when not needed—and this saving is immediately felt at the source, cutting down very perceptibly the use of fuel.

The chart at the right is reproduced from one of many made by recording thermometers under average service conditions. Curve 1 shows temperature maintained in the building for 24 hour period. Curve 2 shows outside temperature at same time. Curve 3 shows how often the valve was opened and closed, and how long steam was on building—altogether 9 hours out of the 24.

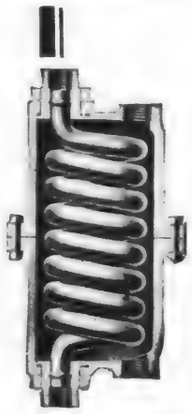
Which demonstrates that when outdoor temperature is above freezing, as it is by far the greater part of the heating season, steam is *needed* only a small percentage of the time, to maintain proper conditions inside.

Let us tell you how you can save heat through the "Master" Control Valve.

HEAT LOSS IS MONEY LOSS (3409)

CENTRAL HEAT APPLIANCES

343 S. Dearborn St. J. C. HORNUNG ENGINEER Chicago, Illinois.



No Man is Better Than His Arteries—

and no hot water heater is better than its coils. Small coils, that soon plug up, interfere with circulation and lessen hot water delivery.

Big coils—and Paracoil Domestic Heaters are noted for big coils—assure long life and real hot water satisfaction.

Paracoil Heaters are guaranteed both as to workmanship and performance. The coils are seamless drawn copper. There are no brazed joints, no chance for rust. The construction is simple and the installing is simple.

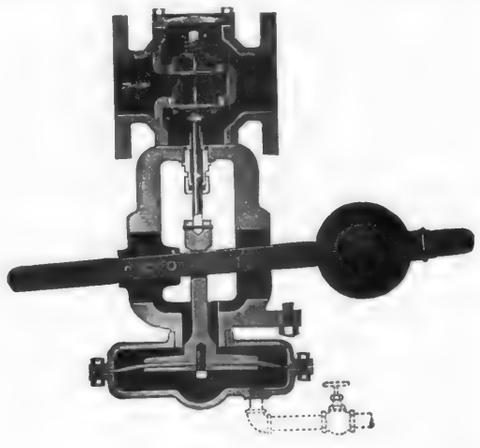
Write us for prices and installation data.

DAVIS ENGINEERING CORP.
90 West Street, New York.
Factory: Elizabeth, N. J.

Also Mfrs. Apartment House Size Instantaneous Water Heaters

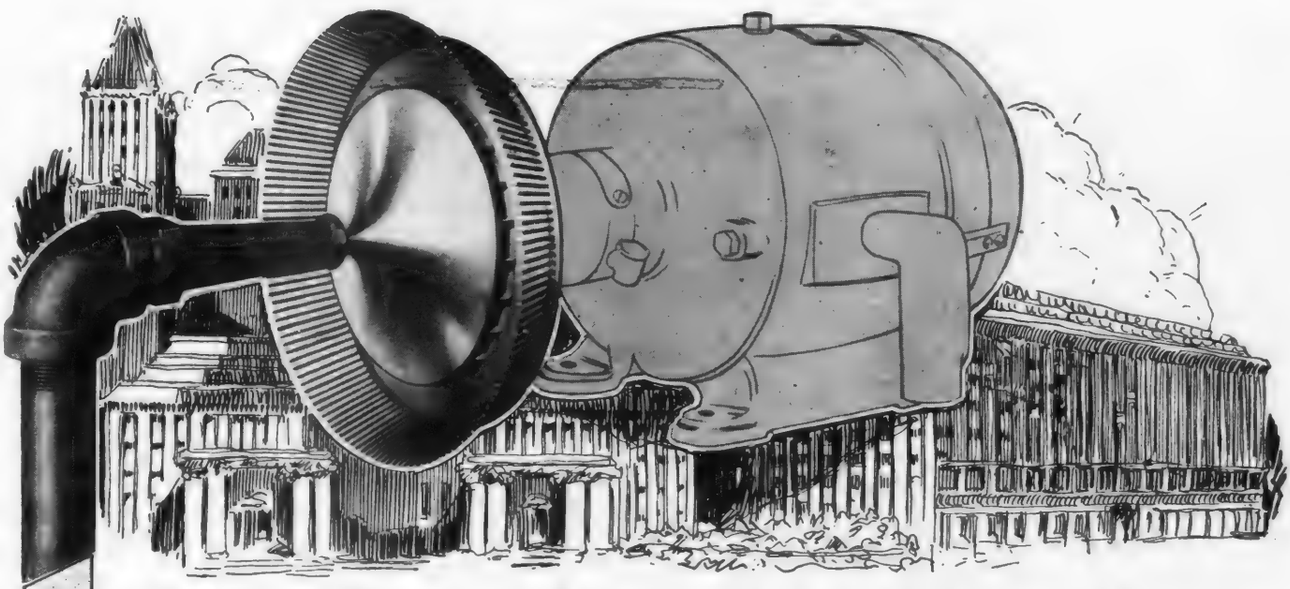
Paracoil Water Heater

Quality ~~KIELEY~~ Simplicity
REGISTERED TRADE MARK

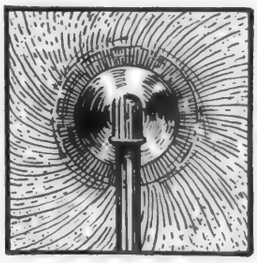


Engineers have specified Kieley Specialties for the Largest Buildings and Power Plants in the United States. Manufacturing Specialties for 47 years warrants that confidence.

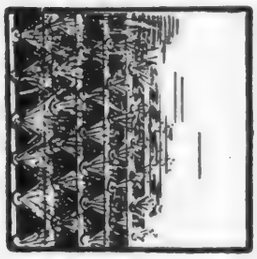
KIELEY & MUELLER, Inc.
34 West 13th St., New York City



The Bayley Air Washer Saves Power!



The Bayley Turbo Air Washer will not clog, needs no pump screen, and requires only nominal water pressure. It churns the water centrifugally into a dense even spray.



The high pressure, multiple nozzle air washer requires water at high pressure screened at the pump and the fine orifice nozzles easily become clogged.

BECAUSE it is based on a new, revolutionary principle in air washers, the Bayley Turbo Air Washer operates at a water pressure of from 75 to 90% lower than the usual high pressure system which requires from 10 to 30 lbs. per square inch water pressure. This reduction in water pressure results in a power saving of from 40 to 60 per cent. In addition to this power saving the Turbo Air Washer saves the repair and maintenance costs of clogged nozzles, a common trouble with the multiple nozzle spray system of washing air. The Bayley Air Washer will not clog because it has no fine orifice nozzles; a simple, large, fire type nozzle delivers the water to the spray wheel where it is whirled into a dense curtain of spray through which no impurities can pass.

Non-clogging and economical in operation—these are the features that make the Bayley the most efficient air washer available today. Write for Bulletin No. 25 giving the complete facts.

BAYLEY MANUFACTURING COMPANY
742 GREENBUSH ST., MILWAUKEE, WIS.

BRANCH OFFICES:

Russell B. Bedford, Suite 503, 30 Church St.	New York, N. Y.
1156 1st National Bank Bldg.	Chicago, Ill.
523 Fenton Bldg.	Cleveland, Ohio
Purcell Stone Co.	
2847 Grand River Ave.	Detroit, Mich.
1928 Railway Exchange Bldg.	St. Louis, Mo.
403 Observatory Bldg.	Des Moines, Iowa
Leiendecker Bros., Fulton Bldg., 2nd Floor	Pittsburgh, Pa.
P. W. Belcher, Dooly Block	Salt Lake City, Utah
Mr. Geo. H. Jerge,	
425 Board of Trade Bldg.	Indianapolis, Ind.

Representative Installations:

Central Hotel .....Lincoln, Nebr.
Junior High School .....Cedar Falls, Iowa
Nashville Railway & Light Co., Nashville, Tenn.
Franklin School .....St. Paul, Minn.
St. Martin School .....Detroit, Mich.
Illinois Steel Co. .....So. Chicago, Ill.
Wisconsin Theatre (Carpenter Bldg.), Milwaukee, Wis.

Bayley
AIR ENGINEERING & EQUIPMENT
HEATING AND VENTILATING
AIR WASHING AND HUMIDIFYING SYSTEMS
MILL EXHAUSTERS—PRESSURE BLOWERS
MECHANICAL DRAFT FANS
AIR AND GAS SCRUBBERS
INDUSTRIAL DRYING SYSTEMS

University of Michigan Union—Ann Arbor, Michigan

Architects: Pond & Pond, Chicago.
Consulting Engineer: C. S. Atkins, Chicago.
Engineer (Swimming Pool): G. S. Williams, Ann Arbor.
Heating Engineers: Schumacher & Backus, Ann Arbor.

THE WHITLOCK COIL PIPE COMPANY

40 South Street **Hartford, Conn.**

New York, Boston, Philadelphia, Chicago, Baltimore, Detroit, San Francisco, and other principal cities. Consult telephone book.

Come On In— the Water's Fine!

And Whitlock Heaters keep it fine in the swimming pool at the University of Michigan Union shown here.

Architects and engineers know that they can depend on Whitlock Heaters to keep the water at just the right temperature—whatever the requirements.

That is why so many of them say if it is

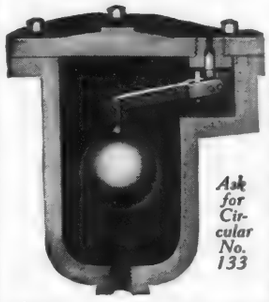
"Hot Water?—Let Whitlock Do It."

WHITLOCK HEAT TRANSFER PRODUCTS

Edition No 2! Write for it.

It tells about the new Campbell Feed Water Regulator; Reducing Valves; Pump Governors; Damper Regulators; Temperature Regulators; Float Valves; Balanced Valves; Control Valves; and Swing Joint Fittings. Ask for Atlas Jr. No. 21, Edition No. 2.

ATLAS VALVE COMPANY
REGULATING VALVES FOR EVERY SERVICE
281 South St., Newark, N. J.



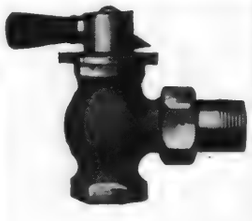
WRIGHT-AUSTIN

AIR TRAPS

Relieve the air from forced circulation hot water Heating Systems, closed vessels, etc., up to 150 lbs. pressure. Simple, very durable, large valve opening.

Ask for Circular No. 133

WRIGHT-AUSTIN CO.
DETROIT, MICH.

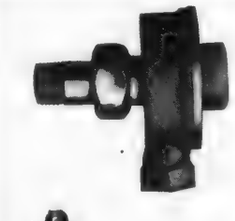


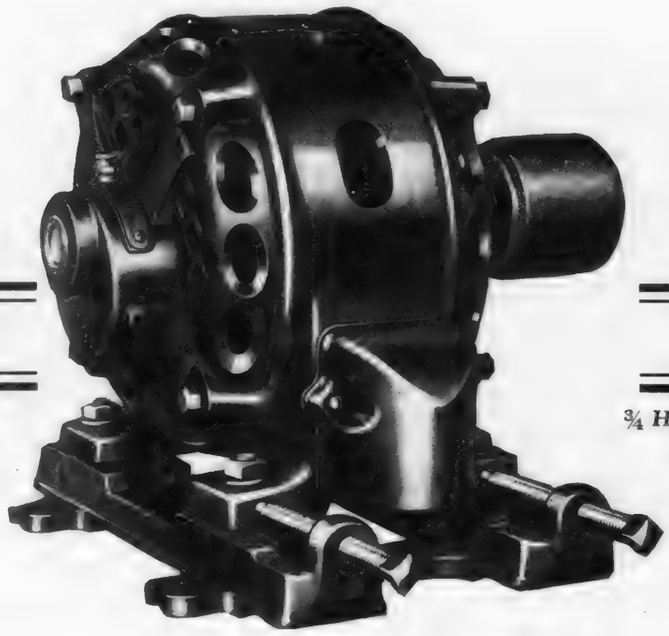
A Dependable Line of Heating Specialties

Stay-Rite Heating Specialties are dependable because they are made right and in strict accordance with heating requirements. They have long since passed the experimental stage. And over many heating seasons they have justified the confidence of their owners and proved the high efficiency of the Stay-Rite Line.

Write for literature and prices

The Ideal Heating Equipment Co.
1250 West 4th Street CLEVELAND, OHIO





"They Keep a-Running"

¾ *Horse Power Century Squirrel-cage Induction Polyphase Motor*

Bearings Protected Against Abrasive Wear

Century Squirrel-cage Induction Polyphase Motors, in one horse power and smaller sizes, are equipped with the Century Wool-yarn System of Lubrication, which protects the motor bearings and contributes to unusually long life.

(1) Tight-fitting Century brass dust cap and dust collars make Century motor bearing housings as nearly dust-tight as it is possible to build them. They remain so throughout the life of the motor.

(2) Cork-gasket-lined cover plates are tightly screwed down over the oil-well slots—further preventing the entrance of dust, grit and foreign particles.

(3) There is no drain plug in the bottom of the oil-well—the oil supply is conserved, being certainly sufficient for a year of continuous 24-hour-per-day operation.

(4) Abrasive particles or compounds cannot reach the bearing surfaces through the oil-well because of the filtering properties of the continuous unbroken strands of wool yarn used in the Century Wool-yarn System of Lubrication.

(5) Because of the superior capillary properties of pure-wool yarn, an ample supply of oil is constantly being delivered to the bearing surfaces.

Temperature rise not more than 40° Centigrade. Built in other Standard sizes from ¼ to 50 horse power.

Send for Bulletin No. 38

CENTURY ELECTRIC COMPANY

1806 Pine St. St. Louis, Mo.

For More Than 23 Years at St. Louis

¼ to 50 H.P. **Century MOTORS** **¼ to 50 H.P.**

The Frank Legless Radiator Bracket

(PATENTED)

Clean Concealed Jobs—

The hanging of radiators with FRANK BRACKETS results in clean concealed jobs, with the maximum of safety and economy.

FRANK RADIATOR BRACKETS are easily installed and simply adjusted.

An outstanding feature of the wall brackets is the use of *only one bolt.* This means, of course, not only a cut in the cost of material, but in labor as well.

That is but one of the salient points that have made Frank Radiator Brackets known throughout the industry.

Write us for full information regarding our complete line of brackets.

THE FRANK RADIATOR BRACKET CO.
30 No. LaSalle St., Chicago

Keep Refrigerating Systems on the Job *with* BRISTOL'S

TRADE MARK REG. U. S. PAT. OFFICE

Cooling and refrigerating systems, both large and small, require constant checking to maintain efficient operating conditions.

Installed at important locations in the system, Bristol's Recording Instruments immediately show when wrong tendencies occur and enable you to quickly locate the trouble. They are a direct means of protection against faulty conditions.

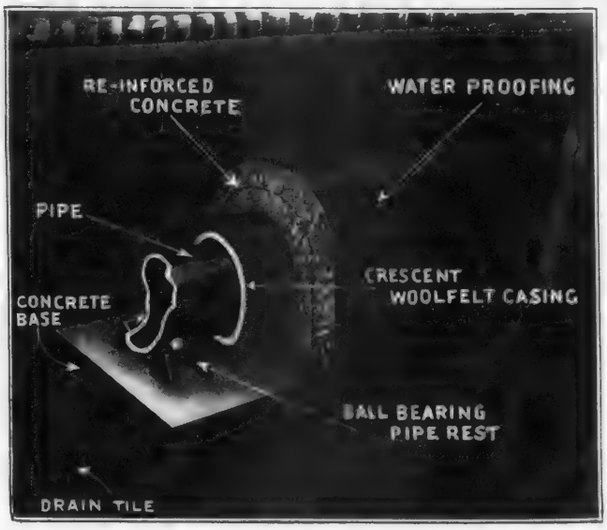
The simplicity and ruggedness of construction permit these instruments to give many years of constant service without repairs or adjustments.

Our engineers can show you where Bristol's may be used to good advantage.

The Bristol Company *Waterbury, Connecticut*

FOR 36 YEARS — Ask Any Technical Engineer — MAKERS OF

BRISTOL'S RECORDING INSTRUMENTS

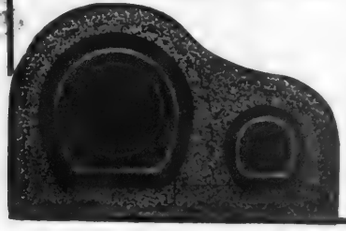


THE CRESCENT SYSTEM

Dirt-Proof Ball Bearings, and Air Space Around Pipe, Permits Rotation of the Pipe, Adding Years to its Life.

Manufacturers and Contractors of

UNDERGROUND STEAM DISTRIBUTING SYSTEMS
TUNNEL OR CONDUIT CONSTRUCTION



"We solicit your correspondence"

W. H. PEARCE & CO.
115 S. Dearborn Street
CHICAGO

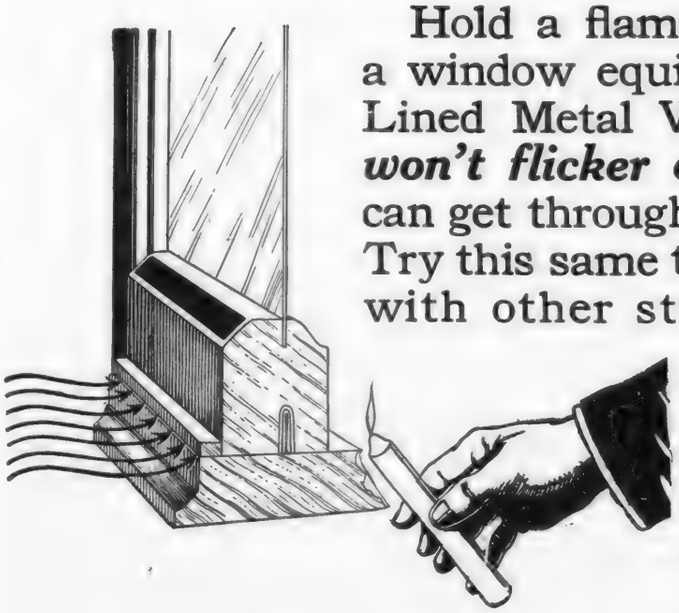
Catalog on Request

Athey

Cloth-Lined Metal Weatherstrip

(For Wood or Metal Windows)

Test it this way when the wind is blowing hard

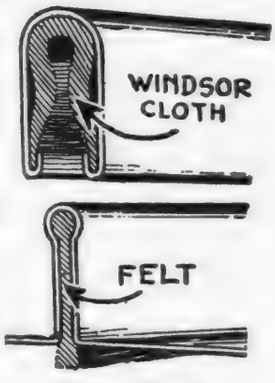


Hold a flaming match to the joint of a window equipped with Athey Cloth-Lined Metal Weatherstrip! ***The flame won't flicker one bit*** because no draft can get through the perfect combination. Try this same test on windows equipped with other strip—you'll see the big difference instantly.

The Athey is the only ***cloth-lined*** metal weather strip made. It is impossible to fit two pieces of metal together tight enough to keep out dust and drafts without making the windows stick. In Athey strip the metal rail runs ***smoothly*** and ***easily*** in a metal channel lined with cloth. No draft or dust or noise can "sneak" through. You can't suck flour through the joint with a vacuum cleaner.

The Athey is the one perfect strip. That's why it is being used in leading buildings of all kinds all over the country.

The metal channel and rail are of imperishable zinc—they will not rust. The cloth used is guaranteed by us to be rot-proof, damp-proof, and moth-proof. Water or ice will not affect it. It won't pull out.



(Enlarged View)

Athey Perennial Window Shades

Another Athey product. Fold like a fan. Can be raised from the bottom, or lowered from the top. No rattle or fluttering, even when the wind blows. Made of indestructible cloth thoroughly shrunken and waterproofed. Rain won't hurt them. For any fine building.

Write for complete information and prices

Athey Company

6077 West 65th Street - Chicago, Illinois

—and in here 3148 SARCO Radiator Traps and Valves

The planning and construction of such large, important buildings as the one shown is not entrusted to amateurs. When such architects and contractors as Rouse & Goldstone and the Raisler Heating Co. have sufficient confidence in Sarco Radiator Traps and Packless Inlet Valves to install 3148 in one building, they come pretty near *knowing* that these traps will give satisfaction and that they can depend upon the manufacturers to back up their promises.

Some of the features of Sarco Radiator Traps that appeal to architects and engineers are:

They are factory adjusted, noiseless, and won't freeze or air bind. Are self-cleaning and easy to take apart. Have unusually large discharge opening and high lift.

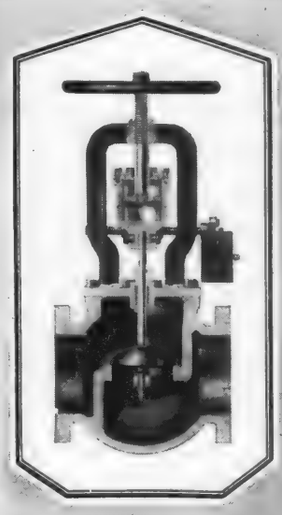
Other features are explained in Booklet P-133. Send for a copy.

SARCO COMPANY, Inc.

183 Madison Ave., New York

Boston Chicago Detroit
Buffalo Cleveland Philadelphia
Peacock Bros., Ltd., Montreal

Murray Hill Bldg. Madison Ave. and 40th St., New York. Architects: Rouse & Goldstone, New York. Contractors: Raisler Heating Co., New York.



The Davis Stop and Check Valve permits steam to flow from boiler to header, but closes automatically should the flow be reversed. Made in globe and angle patterns, for pressures up to 350 lbs., and total temperatures to 800 degrees. Sizes 2 to 12 inches.

This valve won't leak

DAVIS Stop and Check Valves are free from the troubles of the internal dashpot. On the Davis the oil dashpot is outside and the action of the valve is visible.

This valve will not stick—scale doesn't bother it—it is always reliable and silent. You can test its operation easily by hand, and as often as you like.

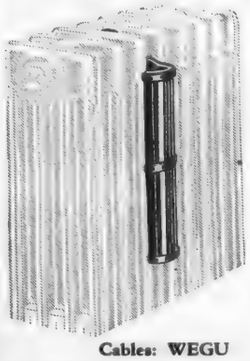
Send for the Davis Catalog with complete information on the full line of Davis Valve Specialties.

DAVIS VALVE SPECIALTIES
STEAM-SAVERS SINCE 1875

G. M. DAVIS REGULATOR CO., 422 Milwaukee Avenue, Chicago, Ill.

H&V7—Gray

EVAPORATING VESSELS



of red porous earthenware with

WEGU-SAFETY-HOLDFAST
PATENTED

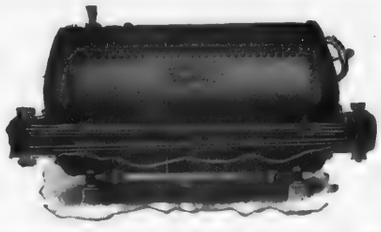
moisten the dry-air caused by the heating system

Sample with porto, $1.00

Sole Agents Wanted

W. & W. GÜNTHER
RANSBACH—Westerwald
(Germany)

Cables: WEGU



Alberger-Buffalo Storage Heaters have tubes the full length of tank which insures maximum heat transfer. Satisfaction guaranteed. Write for information on Alberger Multi Head Heaters and Howard Guided Expansion Joints.

ALBERGER HEATER COMPANY
HOWARD IRON WORKS
281-289 Chicago St. Buffalo, N. Y.

WEATHER STRIP *Specifications to be Complete must include* CHAMBERLIN CALKING!

Illustration above shows method of sealing cracks around windows and doors in masonry walls with Chamberlin Calking Compound. It adheres perfectly and will not chip off or crumble.

A COMPLETE Chamberlin Installation greatly simplifies matters for the Heating Engineer because in designing a heating system he is more certain to strike a proper balance between output and input of heat. The following facts reveal very clearly why a building equipped with the best heating plant may still be cold and draughty.

A window of average size will leak 47 cubic feet of air per minute when the wind is blowing only 15 miles per hour—and this isn't the only leakage. The un-calked cracks around doors and windows will leak an additional 9 cubic feet of air per minute when the above wind velocity prevails.

Chamberlin Metal Weather Strips and Calking, as installed by Chamberlin experts, shut out 85 to 95% of this leakage. This has been proven in rigid leakage tests on 10 to 33 year old Chamberlin installations. Write for information.

Chamberlin Metal Weather Strip Company

West Lafayette Blvd., Detroit, Michigan

100 Sales and Service Branches throughout the United States

CHAMBERLIN METAL WEATHER STRIPS
"SINCE 1893-THE STANDARD"

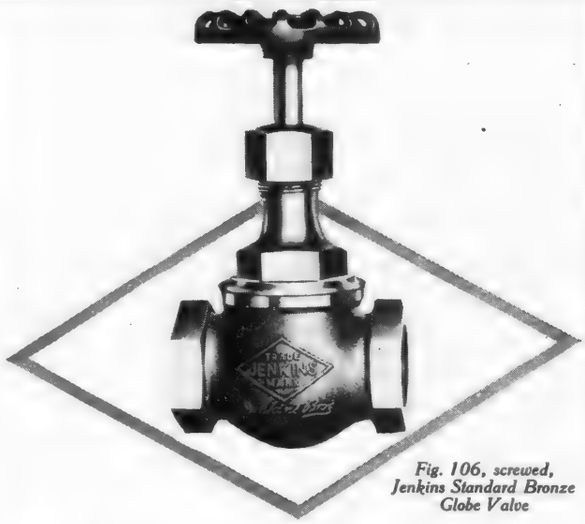


Fig. 106, screwed, Jenkins Standard Bronze Globe Valve

What do your customers say about you?

Fig. 108, screwed, Jenkins Standard Bronze Angle Valve

Nothing quite takes the place of favorable word-of-mouth publicity, and it pays to give your customers no chance to be other than boosters.

Jenkins Valves protect the owner's interests and yours too. They are equipment of known reliability—made to quality standards for over sixty years. They are made with the reserve strength to resist pipe strains and other severities of heating service.

Fig. 168, Jenkins Bronze Radiator Angle Valve with male union

No valve is a genuine Jenkins unless it bears the Jenkins "Diamond" mark. Make sure your men know this mark and see it on each valve they install.

JENKINS BROS.

80 White Street....New York, N. Y.
524 Atlantic Avenue..Boston, Mass.
133 No. Seventh St., Philadelphia, Pa.
646 Washington Blvd. ..Chicago, Ill.

JENKINS BROS. LIMITED
Montreal, Canada London, England

Always marked with the "Diamond"
Jenkins Valves
SINCE 1864

COMMONWEALTH Lavigne Radiator Valves are the result of years of experience gained through intense application to valve design and manufacture by an organization specializing in radiator valves.

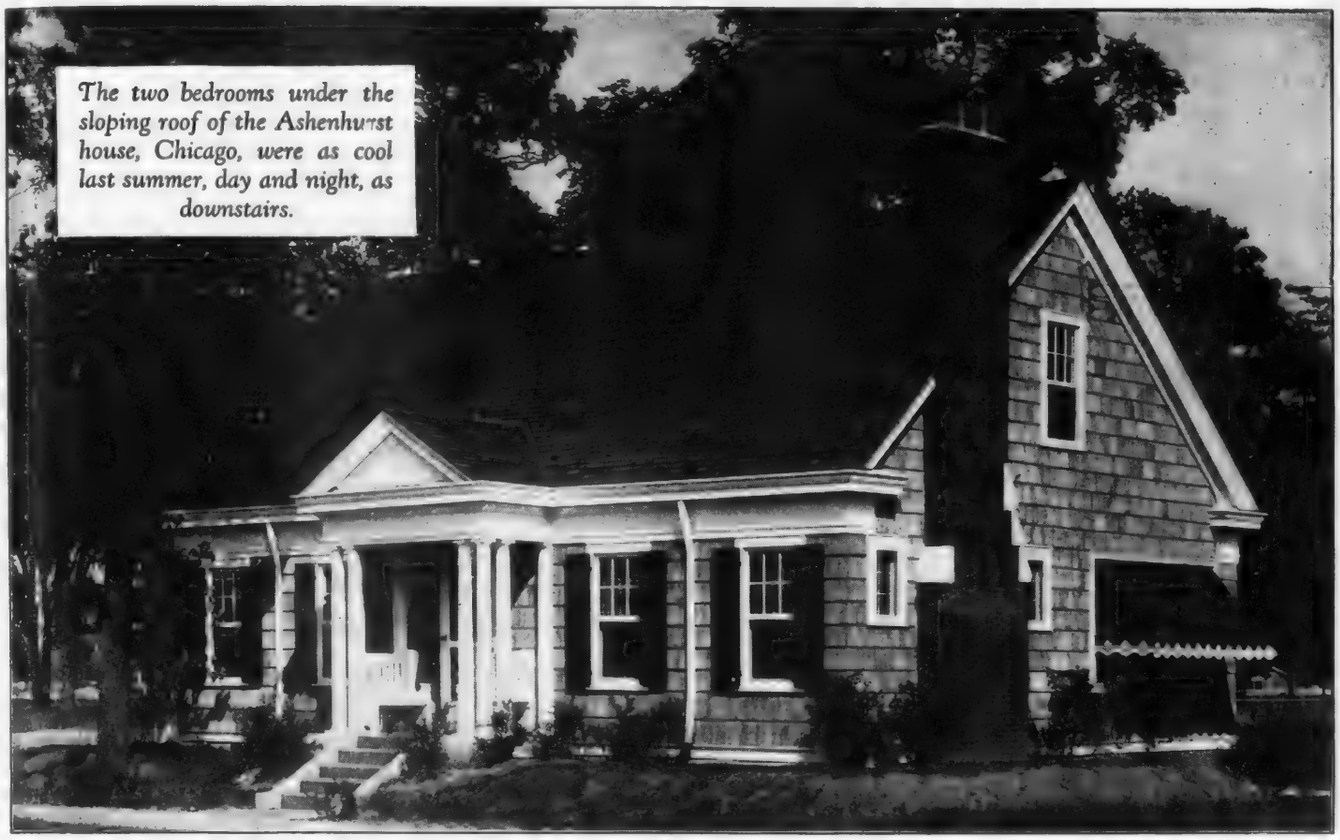
Every valve is sold on its merits.

In these valves correct engineering principles have been combined with careful manufacturing to produce radiator valves which will give maximum satisfaction in service.

Your Jobber Can Supply You

Commonwealth Brass Corporation
Detroit

COMMONWEALTH
LAVIGNE
Radiator Valves



The two bedrooms under the sloping roof of the Ashenhurst house, Chicago, were as cool last summer, day and night, as downstairs.

On the hottest night—*the sleeping rooms in this home are as cool as downstairs!*

It is Insulexed. Aerated gypsum, poured in place on the job, 4 inches at ceilings and $3\frac{5}{8}$ inches in the walls, containing millions of tiny air cells evolved in the process of mixing, seals the house tight against the summer sun.

This thickness is real insulation, more effective by from 1½ to 7 times than any other insulation material, as shown by heat-transmission tests by recognized authorities. Figures will be supplied any heating engineer on request.

In ordinary construction, a roof soaks in heat all day, and radiates it downward into the rooms during the night. Insulex keeps heat out, just as it keeps heat within, in winter. It also makes frame construction practically fireproof.

Comfortably heated with gas last winter as cheaply as adjoining houses were with other fuel. Radiation was reduced from 711 ft. estimated as necessary in an uninsulated house of this size, to 324½ ft.

UNIVERSAL GYPSUM COMPANY, *Chicago*

Dept. 18, 111 West Washington Street

Insulex for winter comfort, too.

Manufacturers of Gypsolite, the tried and better gypsum wallboard for construction and repair work.

INSULEX
UNIVERSAL GYPSUM
GYPSUM INSULATION
REG. U. S. PAT. OFFICE

UNIVERSAL GYPSUM COMPANY,
111 W. Washington St., Chicago
Send me your booklet, "Cutting your Fuel Costs," facts about gas heating, and thorough insulation.

Name.....

Address.....

City.....*State*.....

No. 7—Have you checked your valve requirements with the

SCOTT LIST—?

Scott Bronze Check Valves

No. 82	—S.E.	Regrinding Swing Check	125 lbs. S.W.P.
No. 86	—S.E.	Noiseless Cushion Check	125 lbs. S.W.P.
No. 87	—S.E.	Rouse Swing Check	125 lbs. S.W.P.
No. 90	—S.E.	Rouse Angle Ch. with Un	125 lbs. S.W.P.
No. 194	—S.E.	Std. Horizontal Check	125 lbs. S.W.P.
No. 195	—S.E.	Std. Vertical Check	125 lbs. S.W.P.
No. 206	—S.E.	U.B. Regrinding Check	200 lbs. S.W.P.
No. 86-E	—S.E.	Flower Cushion Check	250 lbs. S.W.P.
No. 253	—S.E.	U.B. Regrinding Check	250 lbs. S.W.P.
No. 353	—S.E.	Regrinding Check	350 lbs. S.W.P.

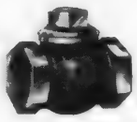
Scott Iron Body Check Valves

No. 83	—S.E.	Regrinding Swing Check	125 lbs. S.W.P.
No. 84	—F.E.	Regrinding Swing Check	125 lbs. S.W.P.
No. 88	—S.E.	Rouse Swing Check	125 lbs. S.W.P.
No. 89	—F.E.	Rouse Swing Check	125 lbs. S.W.P.
No. 59	—S.E.	Regrinding Swing Check	250 lbs. S.W.P.
No. 60	—F.E.	Regrinding Swing Check	250 lbs. S.W.P.
No. 198	—S.E.	Flower Cushion Check	250 lbs. S.W.P.
No. 199	—F.E.	Flower Cushion Check	250 lbs. S.W.P.

S.E. Screwed Ends S.W.P.—Steam Working Pressure
F.E.—Flanged Ends O.S.&Y.—Outside Screw & Yoke

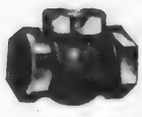
No. 90 "Rouse" Angle Bronze Swing Check

No. 87 "Rouse" Bronze Swing Check



No. 194 Std. Bronze Horizontal Check

No. 82 Regrinding Bronze Swing Check



No. 253 Extra Heavy Union Bonnet Regrinding Check

No. 353 Extra Heavy Bronze Swing Regrinding Check

SCOTT VALVE MANUFACTURING COMPANY

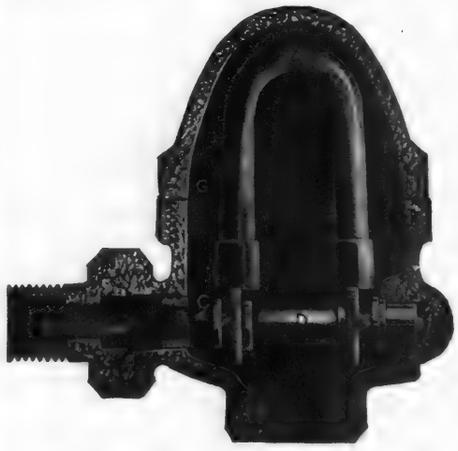
DETROIT - - - MICHIGAN

Manufacturers of the Complete Line of

SCOTT VALVES

SINCE 1886 SIGN OF VALUE

"MAXIMUM SERVICE PER DOLLAR"



"VENTO" Advantages

System starts with valve wide open, assuring circulation almost the instant steam is turned on.

Control of valve opening from two to eight times larger than other makes of valves.

Size of valve opening reduces danger of fouling with scale or other foreign matter.

Closes absolutely tight against steam. No necessity for use of spray water at pump.

Cannot stick or gum from foreign matter, and operation is absolutely noiseless.

The Perfect Automatic Valve for Vacuum or Vapor Heating

The "Vento" Automatic Valve represents a steady improvement in the Haines line of steam traps and offers the highest degree of steam trap efficiency.

There has been no change in the old reliable principle that has placed Haines Automatic Valve in a class by itself. The operating power is identical—the only difference being in the general construction.

Special features are: Horizontal mounting of valve mechanism—long range of movement—positive action—quick opening and closing.

Send for booklet

WILLIAM S. HAINES & CO.

12th & Buttonwood Streets

PHILADELPHIA, - - PA.

VENTO

Mercoid Controls approved

Manufacturers of Unit Heaters have approved Mercoid Controls in connection with their product

THE DIAGRAM above shows the method of hooking up the Mercoid Control to one type of Unit Heater.

With this control, an even room temperature is maintained automatically.

If the temperature rises above a desired point, the fan stops—and automatically starts again when the temperature falls. By a simple adjustment, this control can be set to start and stop the fan at any desired temperature within its range.

Mercoid Thermostats are regularly furnished with an adjustable range of 56° to 80°. Higher or lower temperatures can be supplied.

Contacts are enclosed. No open arc. No corrosion.

The installation above is used with motors of less than one horsepower. For motors of one horsepower or over, an automatic across-the-line starting switch is required. Mercoid Thermostats will carry line current, either D. C. or A. C., 25-60 cycle, 110 or 220 volts.

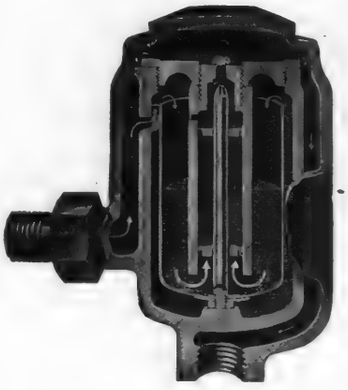
If you are interested in Unit Heaters as a manufacturer, dealer, or user, you are invited to write for our descriptive folder.

We have recently been advised of the approval of Mercoid Controls by the following manufacturers of Unit Heaters:

American Blower Co.
Detroit, Mich.
Autovent Fan & Blower Co.
Chicago, Ill.
Buffalo Forge Co.
Buffalo, N. Y.
Dwyer Equipment Co.
Chicago, Ill.
Ilg Electric Ventilating Co.
Chicago, Ill.
Modine Mfg. Co.
Racine, Wis.
New York Blower Co.
Chicago, Ill.
Pecco, Inc.
St. Louis, Mo.
Skinner Brothers Mfg. Co.
St. Louis, Mo.
B. F. Sturtevant Co.
Hyde Park, Boston, Mass.
York Heating & Vent. Co.
Philadelphia, Pa.
L. J. Wing Mfg. Co.
New York City

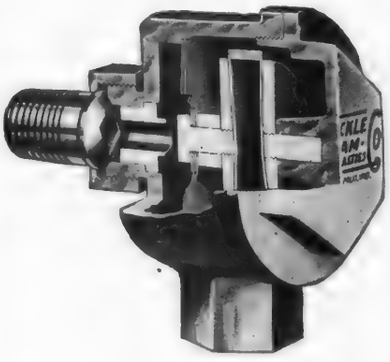
AMERICAN RADIATOR COMPANY
Specialties Department
816 So. Michigan Ave. Chicago, Ill.

STICKLE RADIATOR TRAPS



Installations ten and twelve years old. Still in satisfactory service in large establishments are to the credit of the trap to the left.

Are you getting tired of changing traps on the same job every few years? We solicit your inquiries on the Stickle (Patented) Bucket Type Radiator Trap. All sizes from ½" to 2" inlets and outlets.



Look at the Stickle Thermostatic Radiator Trap. Don't you think it has some good points, with the loose diaphragm, flat leaf spring, and position of valve and seat? See how the diaphragm is protected. It is patented. Yet you will be surprised at the low price, but not unless you will let us get in touch with you. Drop us a line now.

STICKLE STEAM SPECIALTIES CO.

NEW YORK **Indianapolis, Ind.** BOSTON

Instant Hot Water

DAHLQUIST AQUATHERM COPPER RANGE BOILER

A Device That Has Long Been Needed

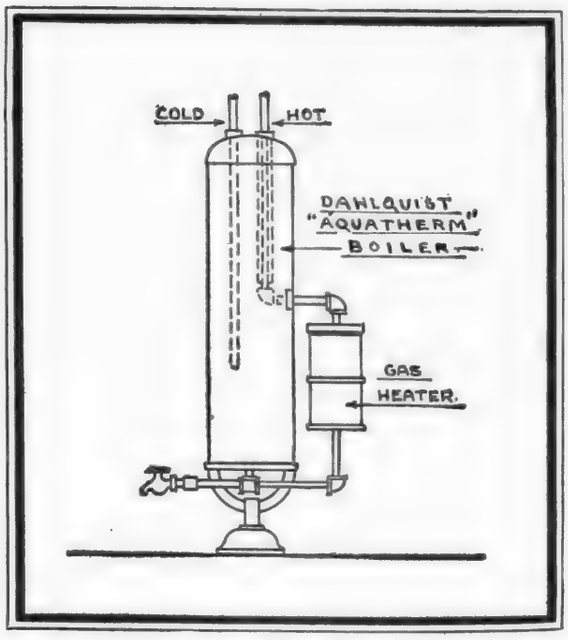
One of the most important developments in range boiler construction in many years is the DAHLQUIST AQUATHERM COPPER RANGE BOILER, which furnishes the consumer instant hot water at a minimum cost. It comes in any size desired.

Can be installed with any ordinary gas tank heater, water back in coal range, indirect heater, or coil in boiler or furnace, or electric heater.

And the DAHLQUIST AQUATHERM can be furnished separately in proper size for any range boiler now installed.

Let us send full details

DAHLQUIST MFG. CO.
30 W. 3rd St., SOUTH BOSTON, MASS.



Dahlquist Aquatherm Copper Range Boiler installed in connection with gas tank water heater in kitchen (note the simplicity and neat appearance of installation).

Are Comparative Sales An Index To Merit?
There are more Minneapolis Heat Regulators in use than all other automatic heat controlling devices combined—and this leadership has obtained, without interruption, for 41 years!
The "MINNEAPOLIS" HEAT REGULATOR for COAL—GAS—OIL
Whether your home is heated by coal, coke, gas, or oil, if you are without automatic heat regulation you are sacrificing both comfort and convenience and paying for your neglect besides through higher fuel bills. End this sacrifice today. Install the heat regulator that the American public has voted the most satisfactory for any type of heating plant — the Minneapolis.
The Minneapolis Heat Regulator is sold and installed by a nation-wide organization with branch offices in principal cities and experienced dealers in almost every community. Branch and distributing offices New York, Chicago, Philadelphia, Boston, Detroit, Cleveland, St. Louis, Cincinnati, Milwaukee, Pittsburgh, Baltimore, Washington, D. C., Buffalo, Syracuse, St. Paul, Kansas City, Omaha, Denver, Portland, Ore., Seattle, Hartford, Conn.
Mail This Coupon
Minneapolis Heat Regulator Company,
2803 Fourth Ave. South, Minneapolis, Minn.
Please send me full information regarding automatic heat control and a copy of your free instruction book for home-owners, "The Proper Operation of the Home Heating Plant." I have checked below the kind of fuel I am using or considering:
Coal ☐ Coke ☐ Gas ☐ Oil ☐ District Steam ☐
Name .....
Address .....
City or Town and State .....
THE MINNEAPOLIS
100 90 80 70 60 50
60 70 80
MINNEAPOLIS-77
SEVEN JEWEL

Consistent national advertising is steadily creating demand for the Minneapolis Heat Regulator. The above full page advertisement appears in the July 10th issue of the *Saturday Evening Post* and July issues of *House Beautiful* and *House and Garden Magazines.*

UNIVERSAL

Cast-iron Water Tube

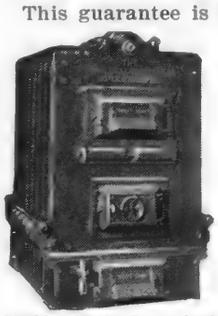
Steam and Hot Water

Heating Boilers

will give years of satisfactory Heating Service and are Fully Guaranteed

We guarantee our boilers to satisfactorily handle a load equal to 50% of the rating shown below. Piping should be included.

This guarantee is based on using bituminous high volatile coal similar to "Pittsburgh Vein" run-of-mine. Firing period four hours in zero weather.



Double Grate Down-draft "Smokeless" (Patented)

Our SMOKELESS BOILERS comply with the law and are guaranteed to pass the smoke ordinance of all cities, using bituminous coal.

The smokeless feature is fool-proof.

Expert or careful firing not necessary.

CAST IRON SECTIONAL BOILERS

100 Per Cent Water Tube Construction

36" SERIES—DOUBLE-GRATE DOWN-DRAFT, "SMOKELESS"

Water-line 48 in. if base of boiler is set in a pit 13 in. deep. Width overall 49 in. Height overall 73 in. Returns 4-2½ in.

Boiler Number, Steam	Steam Rating	Boiler Number, Water	Water Rating	Grate Area Square Feet	Grate Length Inches	No. Sections	Approximate Boiler Length Inches	Outlets 3½ in.	Smallest Dimensions Chimney Inside, In.	Height Chimney Sea Level—Feet
S-32	3800	W-32	6080	9.75	19	7	45	2	15	45
S-42	4500	W-42	7200	13.0	24	8	51	2	15	45
S-43	5200	W-43	8320	13.0	24	9	57	2	15	45
S-53	5700	W-53	9120	16.26	30	10	64	3	16	50
S-54	6400	W-54	10240	16.26	30	11	70	3	16	50
S-64	7100	W-64	11360	19.5	36	12	77	3	16	50
S-65	7800	W-65	12480	19.5	36	13	85	3	16	50
S-74	8150	W-74	13040	22.74	42	13	85	4	17	55
S-75	8500	W-75	13600	22.74	42	14	92	4	17	55
S-84	8850	W-84	14160	26 0	48	14	92	4	18	60
S-85	9200	W-85	14720	26.0	48	15	99	4	18	60
S-95	9450	W-95	15700	29.26	54	16	105	5	19	65
S-96	10150	W-96	16240	29.26	54	17	111	5	19	65
S-97	10500	W-97	16800	29 26	54	18	117	5	19	65
S-106	11000	W-106	17600	32.52	60	18	120	5	20	70
S-107	11250	W-107	18000	32.52	60	19	127	5	20	70
S-108	12100	W-108	19360	32.52	60	20	134	5	20	70
S-117	12250	W-117	19600	36 0	66	20	140	6	21	75
S-118	12650	W-118	20240	36.0	66	21	147	6	21	75
S-119	13000	W-119	20800	36.0	66	22	153	6	21	75
S-1110	15000	W-1110	24000	36 0	66	23	160	6	21	75

24" SERIES—DOUBLE-GRATE, DOWN-DRAFT, "SMOKELESS"

Water-line 57 in. Height overall 67 in. Outlets 4 in. Width 36 in. Returns 2 in.

S-432	1650	W-432	2640	5.0	15	7	85	.....	12	30
S-433	1800	W-433	2880	5.0	15	8	40	.....	12	30
S-443	2200	W-443	3620	6 60	20	9	45	.....	15	35
S-444	2400	W-444	3840	6.66	20	10	50	.....	15	35
S-454	2700	W-454	4320	8.32	25	11	60	.....	16	35
S-455	3000	W-455	4800	8.32	25	12	65	.....	16	35
S-465	3250	W-465	5200	10 0	30	13	70	.....	16	35
S-466	3450	W-466	5520	10.0	30	14	75	.....	18	35
S-476	3800	W-476	6080	11.16	35	15	80	.....	18	40
S-477	4000	W-477	6400	11.18	35	16	85	.....	18	40

Universal Smokeless Boiler Co.

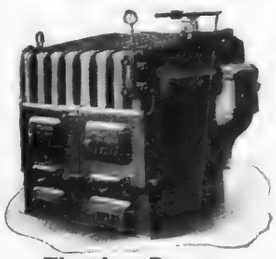
Ravenna, Ohio

THATCHER

BOILERS-FURNACES-RANGES

DURING these days of high fuel costs, the house-owner can easily be sold on the Thatcher Progress—a remarkable boiler that gets the very utmost from each pound of fuel consumed.

The wonderful success of the PROGRESS is due to the fact that it is built on the "triple fire travel" principle that makes for as nearly perfect circulation, combustion and use of hot gases as is practically possible — and thus, every corner of every room of the house will be uniformly, healthfully heated on the very coldest days—and with a remarkably low fuel consumption!



Thatcher Progress Boiler

Has side feed and lowest water line on the market. Flames and hot gases are compelled to go three times through the length of the boiler, before entering chimney.

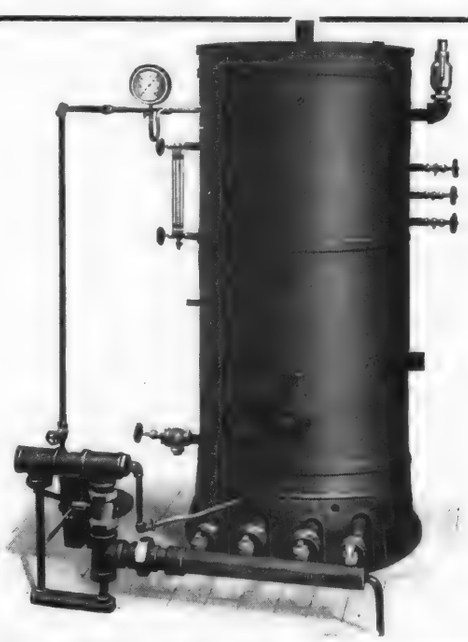
Write, TODAY, for further information on both the "PROGRESS" and our very effective dealer co-operation.

THE THATCHER COMPANY

Since 1850

formerly Thatcher Furnace Co.

Chicago: 341 N. Clark St. Newark, N. J.: 39-41 St. Francis St.
New York: 21 West 44th St.



KANE

Gas Fired Automatic Steam Boiler

Highest Efficiency

The first KANE Gas Fired Steam Boiler was manufactured over twenty five years ago and since that time over 5600 have been installed in this and other countries.

KANE boilers are rendering efficient and valuable service to their satisfied owners and can be identified with every branch of industry where steam, at high or low pressure is required for industrial or domestic purposes. *Send for descriptive literature.*

Monarch Sales & Engineering Co.

Formerly Ofeldt Gas Boiler Sales Corp.

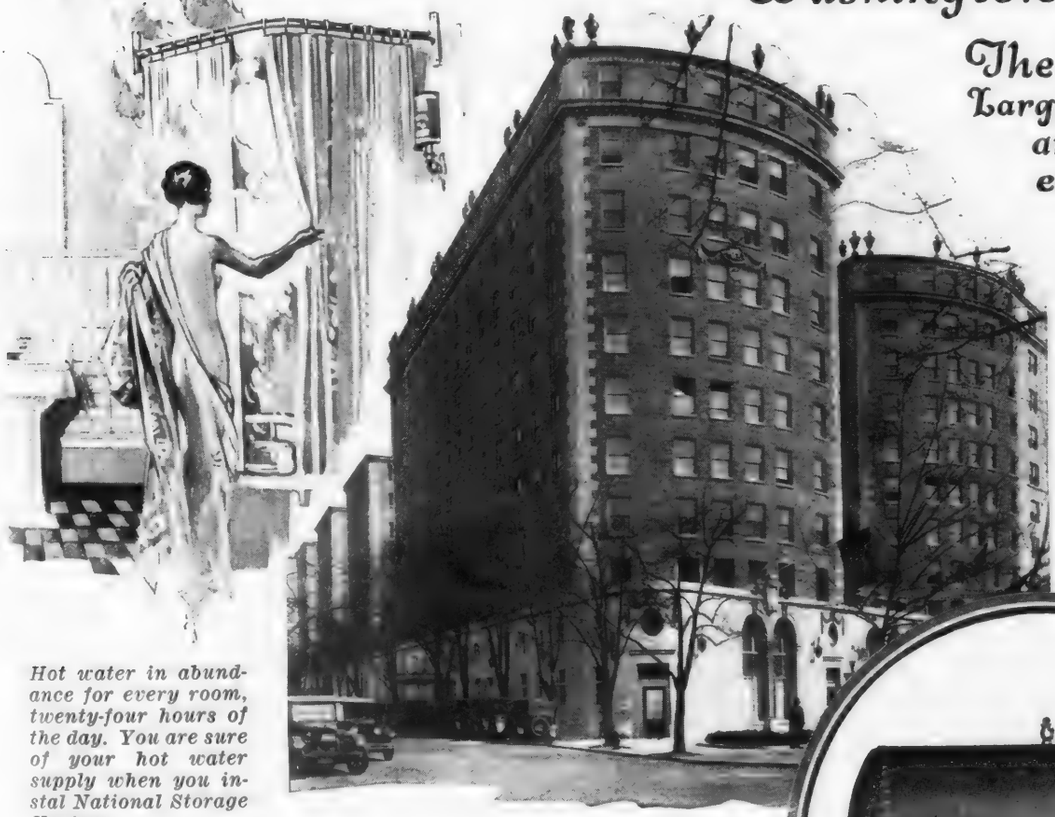
363 W. Erie St., Chicago, Ill.

2010 Locust Street St. Louis, Mo.

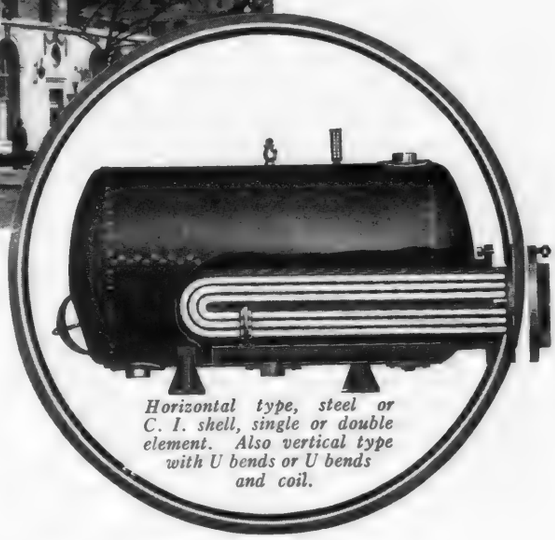
Southern Industrial Engr. Co. American Trust Bldg., Birmingham, Ala.

~ and now in the Mayflower Hotel Washington ~

The Capital's Largest, newest and most exclusive hotel



Hot water in abundance for every room, twenty-four hours of the day. You are sure of your hot water supply when you instal National Storage Heaters.



Horizontal type, steel or C. I. shell, single or double element. Also vertical type with U bends or U bends and coil.

Service that must be maintained on a twenty-four hour a day schedule in this huge building demanded a battery of storage heaters that were reliable beyond all question. The fact that National Heaters were specified for this important installation is a tribute to their satisfactory performance in the past and the care with which they are designed for their particular work.

In either horizontal or vertical type the National Storage Heater is a combination of closed pressure vessel and steam tube heating element. It is ideal for use under conditions where the instantaneous demand for hot water exceeds the immediate steam supply. The National gives remarkably long service, free from trouble.

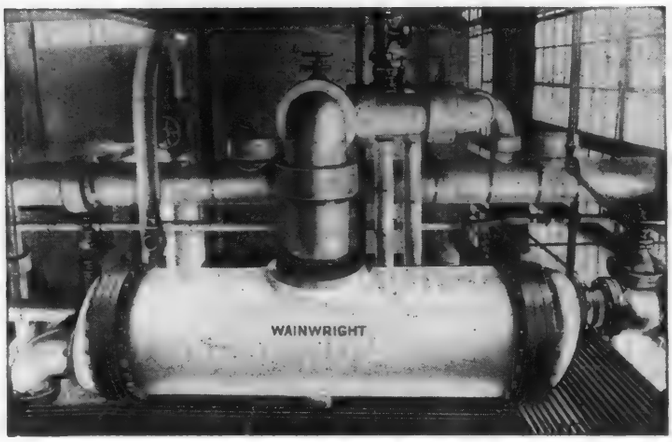
If you are considering Storage Heaters, we will be glad to send our engineers to consult with you on the problem. Our Bulletin fully describes and illustrates National Storage Heaters.

NATIONAL Storage U BEND TYPE Heater

National U Bend Type Storage Heaters are the product of the oldest and most progressive organization in the field. You benefit by 43 years of engineering experience when you buy the National.

The National Pipe Bending Co., Est. 1883, 120 River St., New Haven, Conn., Boston, New York, Phila.

Install National Heaters in Your Next Building



Hot water heating system heater installed in the plant of the American Fabric Co., Bridgeport, Conn. This factory supplies hot water heat to over sixty homes owned by the Bridgeport Housing Corporation.

A Use For Exhaust Steam

OVER the greater part of the U. S., heating is required in all buildings for six to eight months of the year. Low pressure exhaust steam is the cheapest source of heat for this purpose. A hot water heating system can use low pressure steam or even carry a considerable vacuum in warm weather. In many cases low first cost and high operating efficiency may be combined by using the heater as a heater during the winter, and as a condenser during the summer.

The temperature of a building heated by hot water is easily regulated from a central point, and there is no temptation to waste heat by opening windows rather than regulating the individual radiators.

The drips or condensate are all available at one point, uncontaminated with air or foreign matter, for use as boiler feed water.

Hot water may be piped to widely scattered buildings with low pressure loss and less expense than low pressure steam.

WHEELER
CONDENSER & ENGINEERING CO.
Works. **CARTERET, N.J.**
and NEWBURGH, N.Y.
Main Office—149 Broadway, New York City

86

Install
Powell Valves

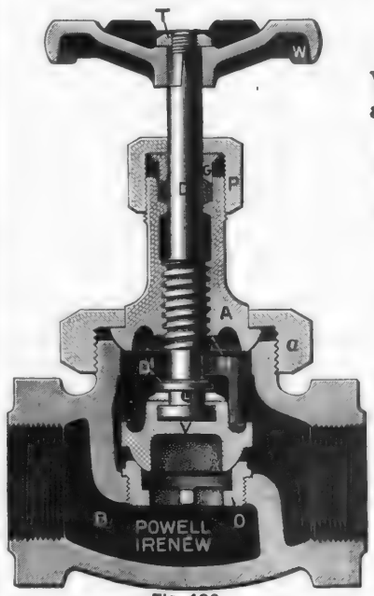


Fig. 190

And Get DEPENDABLE VALVE SERVICE at a minimum cost.

All Parts Are Renewable in POWELL "IRENEW" VALVES

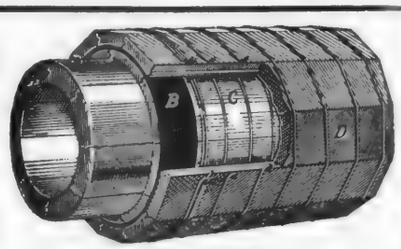
Iron body brass mounted or all iron.

SIZES ¼ TO 3 INCHES

Write for descriptive literature.

THE WM. POWELL CO.
Dependable Engineering Appliances
CINCINNATI OHIO

Wyckoff's Improved Cypress Covering

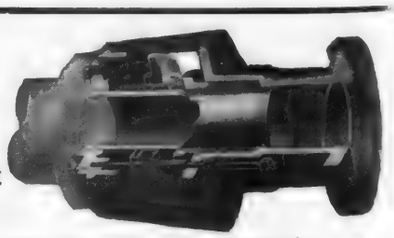


Lasts as Long as The Pipe Itself

As well as being highly efficient in its application, Wyckoff Improved Cypress Steam Pipe Covering withstands all conditions attending steam pipe trenches. All engineers who know Wyckoff Pipe covering specify it because it lasts.

A. WYCKOFF & SON CO. ELMIRA, N. Y.

ROSS Crosshead-GUIDED Expansion Joint Excels in



Design, Construction and Workmanship
Over 60% of sales—Repeat Orders
Once Used—Always Demanded
Every Purchaser—A Customer

ROSS HEATER & MFG. CO., INC., BUFFALO, N. Y.
New York, Chicago, Philadelphia, Boston, Cleveland, St. Louis, Detroit, Pittsburgh, Baltimore, San Francisco, Seattle, Denver, Salt Lake City, Omaha, Montreal, Toronto.

Guard Against Expansion Trouble

In High Pressure Steam and Other Pipe Lines

ONE of the most important features in Underground Work is the proper selection of Expansion Joints built for extreme service.

In the ADSCO Duplex-Sleeve Guided Expansion Joint the stuffing box is especially designed to hold the correct amount of packing to keep the joint tight. The air-cooled polished slip prolongs the life of the packing. You have double insurance against leaks.

ADSCO EXPANSION JOINTS

are used where service conditions demand a high standard product for long life and uninterrupted service.

One hundred twenty-three ADSCO Expansion Joints were installed in Rochester, N. Y., because they have for nearly half a century proven to be both durable and efficient.

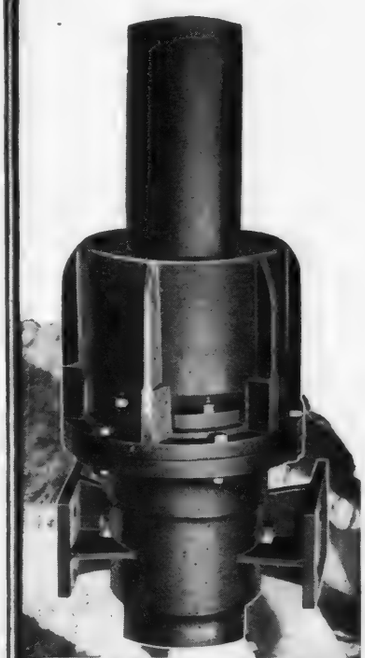
Write for Bulletins covering the ADSCO Line of Expansion Joints for high and low pressure requirements.

AMERICAN DISTRICT STEAM COMPANY

GENERAL OFFICES AND WORKS

NORTH TONAWANDA, N.Y.

Offices: New York Chicago Seattle



The Duplex feature of the Slip preserves packing and insures a tight joint under high pressure and superheat.

ADSCO Expansion Joints installed in ADSCO Underground Steam Lines in Rochester, N. Y., in 1925.

Pin This Coupon to Your Letterhead

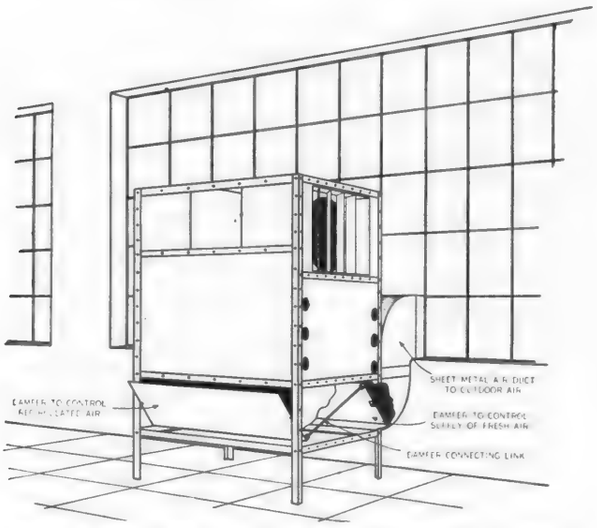
H

AMERICAN DISTRICT STEAM COMPANY North Tonawanda, N. Y.

Please send Bulletins showing the different features of your Underground Construction and Expansion Joints.

Name .....

Address .....



Sketch showing the Twinfan Unit Heater arranged for ventilating purposes. The fresh air intake connection may be made through a window as shown, through the wall of the building or through the roof.

Twinfan Unit Heaters
for
Year-Round Service

In the summer when most industrial heating systems are idle, the Twinfan Unit Heater is put to service as a ventilator. A simple turn of a switch sets the fans to stirring up the sultry, lifeless air.

In the fall and spring these fans, turned off and on in much less time than it takes to open a window, do away with the big waste of heat always present in the direct radiation systems. In the winter while these fans are keeping the heat from climbing to the ceiling, they are likewise keeping the coal bills from soaring.

Twinfan Unit Heaters are being installed in the most modern factories and garages today, because they save space as well as coal bills. The heat output is five to six times that of the same coil surface in direct radiation.

With Twinfan Unit Heaters your customers save money and get better heating results. The heating engineer lowers his labor costs and is sure of his normal profit.

DWYER EQUIPMENT COMPANY
4534 W. NORTH AVE. CHICAGO, ILL.

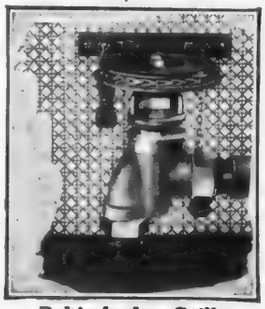
Provides
Convenient Control of Radiators

Enclosed or Overhead On any Heating System

Investigate the
GORTON
Chain Pull
VALVE

New! Attractive! Up-to-date!

Send for full particulars


Behind the Grille

Front View

Gorton & Lidgerwood Co.
96 Liberty Street, New York, N. Y.
Established 1887 Representatives in Principal Cities

HARTMANN
RADIATOR BRACKETS

The radiator hangers used in the construction of a building furnish a good guide in determining the quality of the job. Hartmann Brackets are always to be found in a high-class installation because Architects, Engineers and Contractors have experienced that Hartmann Radiator Brackets are accurately and strongly made, are economical and always dependable.

THREE STYLES

AR NR NV

Write for descriptive circular and price list

Charles Hartmann Co.
975-993 Dean Street - Brooklyn, N. Y.

Better—and Costs Less

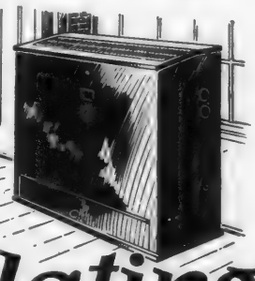
Usually, the better method of doing a thing costs more but pays in the long run. In the case of Industrial Heating Units, the Peerless method is not only better but costs less. Installation is easier, there is much less expense for piping, and the saving of space, as compared with ordinary steam radiation, is a big item. Lower first cost, however, is only one of the features of Peerless Industrial Heating Units. This modern method provides easy control of room temperatures, which means greater comfort and, in the case of workrooms, better and more production. Rooms can be heated faster with Peerless Industrial Heating Units; and, on the other hand, can be cooled faster as well (by simply stopping the motors). Faster heating does not involve any waste of heat, as no more heat units are required, and there is no more drain on the boiler. The cost of current to run the motor is negligible. When desired, automatic control of room temperature can be provided by means of a thermostat, which starts and stops the unit motors. Special ventilation also can be provided for, with necessary equipment for controlling the intake of out-door air. The Peerless Industrial Heating Unit is manufactured in the same plant which builds the well-known Peerless and PeerVent Heating and Ventilating Units. It is therefore backed by twelve years of successful experience with unit systems. Write for literature or any special information. If you prefer to see our local sales representative, please so state.

PEERLESS UNIT VENTILATION CO., INC.

Skillman Avenue and Hulst Street, Long Island City, N. Y.

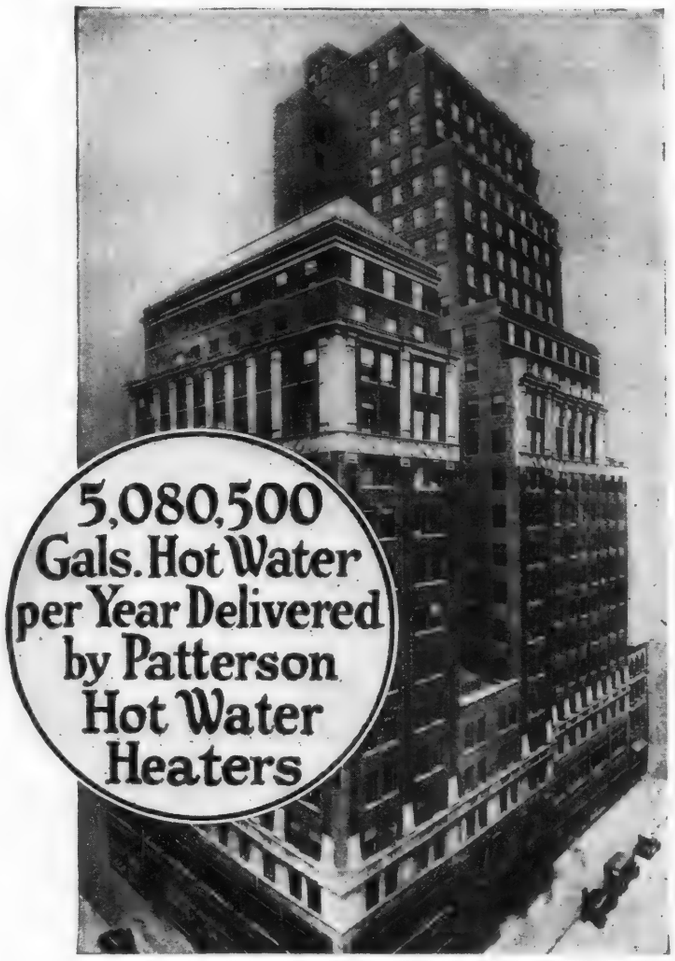
CHICAGO 505 Monadnock Bldg.	PITTSBURGH 339 Second Avenue	DES MOINES 520 Securities Bldg.	BOSTON 100 Boylston St.	PORTLAND, ORE. 927 Board of Trade Bldg.
SPRINGFIELD, MASS. 196 Worthington St.	CLEVELAND 1836 Euclid Avenue	DETROIT 723 Lafayette Bldg.	MINNEAPOLIS 240 Seventh Ave., S.	TORONTO, CANADA 77 York Street

PEERLESS



UNIT SYSTEM

Heating and Ventilating



Borden Building, New York

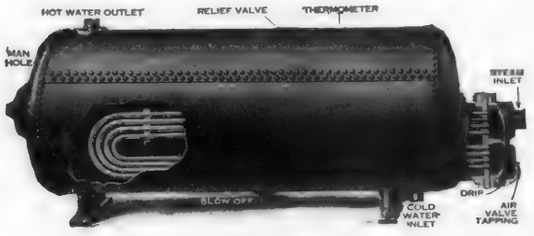
The same skill and shrewdness that have made the Borden Company leaders in their line, enabled them to see the big advantages of selecting Patterson Hot Water Service Heaters to furnish 423,375 gallons of hot water per month to supply 2,000 people in this gigantic building.

All "chance" is eliminated when Patterson Hot Water Heaters are installed. They *must* make good because a 45-year old concern guarantees that they will deliver all the hot water required, as fast as needed and as quickly as it can be drawn.

The owners of thousands of buildings in every section of the country testify to the efficiency and durability of the Patterson.

Please write for catalog and list of users in your section.

The Patterson-Kelley Co.
107 East 40th Street, New York City



Patterson
Hot Water Heaters

BOOKS ON HEATING AND VENTILATING

THE DESIGN OF GRAVITY-CIRCULATION WATER HEATING SYSTEMS. By F. E. Giesecke, Ph. D. A book, remarkable for its conciseness and clearness of expression, which contains the essence of the information needed for the proper design of gravity water heating systems, based on the principle that the frictional resistance must equal the force maintaining flow. The importance of the presentation is evidenced by the fact that the entire water heating section of the A. S. H. & V. E. Compendium of Modern Practice has been discarded and replaced with a new section by Dr. Giesecke, embodying the methods here presented in detail. 64 pages of text and 10 pages of tables and charts. Price, $3.00.

PLUMBERS' HANDBOOK. By Samuel E. Dibble. This work contains valuable data for the heating engineer and estimator, architect, building contractor and sheet metal worker, as well as for the plumber. Each subject is treated by a specialist, the section on Pipe Standards and Pipe Dies by F. N. Speller and that on Heating by Alphonse A. Adler. Size 4 x 7 in. 629 pp. 316 ills. Cloth, $4.00.

MECHANICAL EQUIPMENT OF BUILDINGS. Vol. 1. Heating and Ventilation. By Louis A. Harding and Arthur C. Willard. One of the most complete treatises ever published on this subject. Written for the practicing engineer, as well as for the student. Size 7 x 9½ in., flexible binding. 621 pages and profusely illustrated. Price $6.00.
Vol. II. Power plants and Refrigeration. An equally complete treatise, illustrating and describing in detail modern power-plant design and refrigerating practice. Size 6¾ x 9¼ in., flexible binding. 766 pages, many illustrations. Price $6.00.
Vol. III. Miscellaneous Building Equipment in preparation, including lighting, elevators, vacuum cleaning, sprinkler systems, plumbing, etc.

HEATING AND VENTILATION. By the late John R. Allen and J. H. Walker. This is the second edition of this work and has been brought up to date in every particular, including the latest radiator transmission factors put out by the Research Laboratory of the A. S. H. & V. E. and the Hill synthetic air chart testing method. Especially adapted for use as a text book. Size 6 x 9 in. 322 pages Cloth, $3.50.

STEAM PIPING ITS ECONOMICAL DESIGN AND CORRECT LAYOUT. By A. Langstaff Johnston, Jr. An analysis of the factors governing the flow of steam in pipes with numerous large curves for use in solving the problems of practical installation and determining the most economical size of pipe for any given set of conditions. Pp. 62. Size 5 x 7½ in. Cloth, $2.00.

DESIGNING, HEATING, AND VENTILATING SYSTEM. By Charles A. Fuller. A treatise on the practical application of the engineering rules and formulas in every day use, in laying out steam, hot water, furnace and ventilating equipment for buildings of all kinds, presented in a simple manner. Price $3.00.

STEAM POWER PLANTS: Their Design and Construction. By Henry C. Meyer, Jr., M. E. Third edition, fully revised. One of the standard works on the design and construction of power plants. Covers proportioning boilers, selection and writing specifications for steam engines, selection and arrangement of auxiliaries, construction of chimneys, coal handling, etc. 219 pages. Size 6 x 9 in. Illustrated with folding plates. Price, $2.00 postpaid.

PRACTICAL STEAM, HOT WATER HEATING AND VENTILATION. By Alfred G. King. Containing 396 illustrations. The book is a working manual for heating contractors, journeymen, steam fitters, architects and builders. Describes various systems of heating and ventilation and includes useful data and tables for estimating, installing and testing such systems. 8vo. 367 pages. Price, $4.00.

MECHANICS OF HEATING AND VENTILATING. By Konrad Meier. Including a series of ten charts containing data relating to the flow of water, steam and air, collected by Mr. Meier during an experience of 26 years in heating and ventilating work, both in this country and abroad. Each of the charts replaces a series of tables on the subject, giving at a glance the results of a calculation from any combination of factors. 161 pages, illustrated, with ten large charts. Size 6 x 9 in. Price, $5.00. Separate sets of charts printed on cloth, with lines in different colors and mounted on boards. Single charts, $1.50. Sets of ten, $15.00.

HOUSE HEATING WITH OIL FUEL. Presents in concise form the meat of the available information on the various phases of the problem of oil burners as a source of heat for homes. By P. E. Fansler, E.E., Associate Editor, The Heating and Ventilating Magazine. Second edition, 63 pages, with charts and illustrations. Price $1.00.

HANDBOOK FOR HEATING AND VENTILATING ENGINEERS. By James D. Hoffman. Fourth edition of this important work entirely rewritten and reset. A standard manual covering theory and practice, with special chapters on heat losses, furnace heating, water and steam heating, mechanical vacuum heating, mechanical warm-air heating, temperature control, electrical heating and refrigeration. With appendix of 75 tables. Size 4½ x 6¾ in. Pp. 478. Price $4.50 postpaid.

HANDBOOK OF THE NATIONAL DISTRICT HEATING ASSOCIATION. Devoted to data on all phases of Central Station heating work, including generation, distribution, utilization, meters and water heating, compiled by the Association's Educational Committee. All new and revised data for this book will be supplied free for five years. Bound in leather, with six-ring binder. Price $5.00, postpaid.

THE HEATING and VENTILATING MAGAZINE
1123 BROADWAY, NEW YORK

Installations of Mouat System of Heating Steadily Increased

City Building, Logansport, Ind.

Another Building in Indiana Mouat Equipped

The efficiency of the Mouat System of Heating continues to attract considerable attention throughout the heating industry. The reaction to this is a steadily increasing demand on the part of the heating engineer in collaboration with architect and owner that Mouat System be installed.

One of the latest Mouat installations is that in the City Building at Logansport, Indiana.

The Mouat System is a two-pipe gravity vapor or atmospheric steam heating system, maintaining a pressure of 1 to 3 ounces. Rapid changes or extremes in temperature do not affect its efficiency. It is flexible and meets all demands in all types of buildings.

Let us send full information

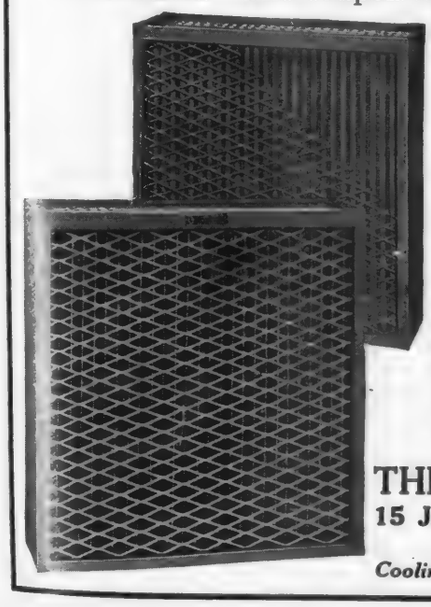
VAPOR MOUAT HEAT

MOUAT VAPOR HEATING COMPANY
CLEVELAND, OHIO

VAPOR MOUAT HEAT

Ventilating Engineers
—Should Send for This Booklet

Ventilating engineers, faced with the selection of air filtering apparatus, should know about the Tangldust System of Air Filtration. The coupon in the corner will bring an interesting booklet to your attention.

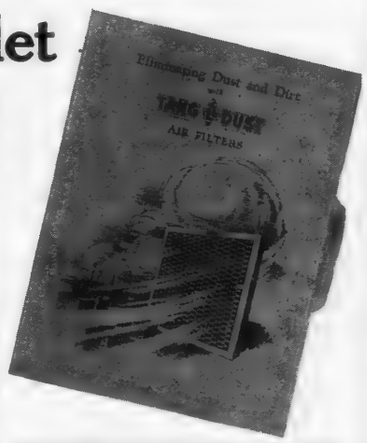


Tangldust Air Filters

As an improvement over the type of filter consisting of merely a frame filled with mineral wool or expanded metal, we have designed Tangldust Air Filters in two stages. This prevents the building up of a resistance to the air flow and makes for easier cleaning. In addition, a renewable oil-soaked pad at the top of each filter cell keeps the filter from drying out between chargings. These added features are worth your serious consideration.

THE COOLING TOWER CO., Inc.
15 John Street **New York**

Manufacturers also of
Cooling Towers *Spray Nozzle Systems*



The Cooling Tower Co., Inc.,
15 John St., New York.

Please send us booklet "Eliminating Dust and Dirt with Tangldust Air Filters."

..... (Firm)

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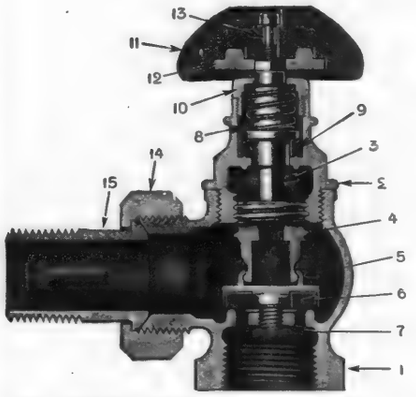
McALEAR

RADIATOR VALVES AND TRAPS
FOR VAPOR AND VACUUM HEATING SYSTEMS



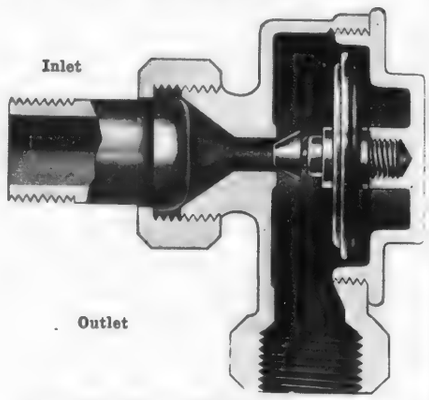
No. 39 Wheel Handle Angle Pattern

THIRTY-FIVE REPRESENTATIVES

To give you prompt service on heating and power problems.

CATALOG No. 28

Giving complete information, prices, installation-engineering blueprint data sent on request.



Nos. 29, 29-A, 33, 34 and 36, showing interior construction

Loose Leaf Pages Showing the Complete McAlear Line of Heating and Power Specialties, with Blueprint Installation Data, to fit T.E.B. or Kalamazoo Binders will be Sent on Request.

McALEAR MFG. CO.
1901-7 So. Western Ave.
CHICAGO

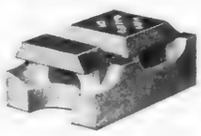
CORRECTLY DESIGNED
Cast Iron Blow Off Basins
also
APPROVED GARAGE BASIN EQUIPMENT

INLAND IRON WORKS
99-111 McDonough Street JOLIET, ILL.

Are You Preparing for the Heating Season?

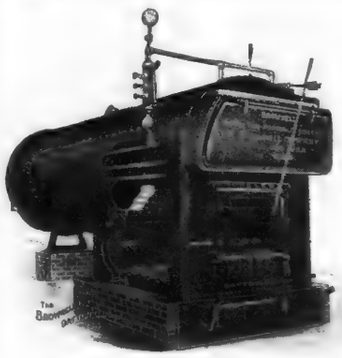
Install **PYRAMID GRATES** and effect a big saving in fuel bills.

Burn Rice Coal.



Let Us Send Full Details

PYRAMID IRON PRODUCTS CO.
136 Liberty Street New York City



Brownell Return Flue Portable Heating Boiler—Smokeless Type

BROWNELL

Better Boilers for Heating and Power Purposes
70TH YEAR

of successful manufacturing experience. This is the reason why Brownell Boilers are specified by all the leading Heating and Contracting Engineers.

BROWNELL Steel Heating Boilers are
LOW IN FIRST COST
HIGH IN EFFICIENCY
BUILT TO LAST A LIFETIME

Our reputation is your insurance of a high quality product. Let us solve your heating problems. Sales representatives in all principal cities. Send for them.

THE BROWNELL CO.
DAYTON, OHIO

THE BROWNELL COMPANY — The World Over — SINCE 1855 — DAYTON, OHIO, U.S.A.

Established 1855

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BOILERS

IRON BODY GATE VALVES

SCREWED, FLANGED
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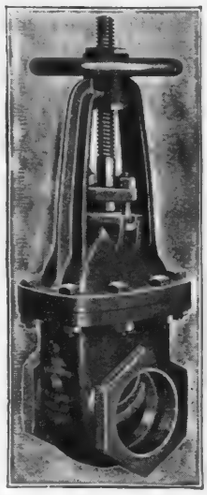
NON-RISING STEM
AND
O. S. and Y. PATTERNS

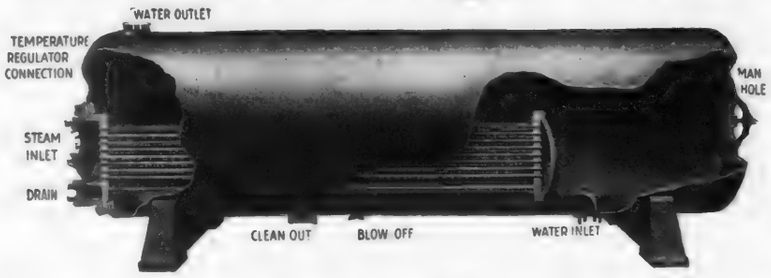
ALSO MANUFACTURERS OF
Cast and Malleable Iron Fittings



Illinois Malleable Iron Company

1801 Diversey Parkway :-: :-: Chicago, Ill.

Russell Storage Heaters



Straight-tube or U-tube Type

A type and a capacity for every requirement. Special features of construction, advantages, and rating tables in bulletins which will be sent on request.

Send the coupon for full information

The Griscom-Russell Company

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Philadelphia	Chicago		St. Louis	San Francisco
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Pittsburgh	Milwaukee		Houston	Salt Lake City
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For Canada: Riley Engineering and Supply Co., Ltd., Toronto

THE GRISCOM-RUSSELL CO.,
Dept. H, 285 Madison Ave., New York City.
Gentlemen:—
Please forward immediately a free copy of your information leaflet on the G. R. Instantaneous Heater.
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Address .....
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"Keeping Others In Hot Water"—

for
Hotels, apartment buildings, hospitals, Y. M. C. A. buildings, schools and laundries

Special Attention Given to Installations Requiring Large Quantities of Hot Water, with Live or Exhaust Steam as the Heating Medium.

—may be a pastime for some folks, but for the Sims Company it is a serious proposition—a matter requiring a thorough knowledge of hot water requirements.

A long study of these requirements enables us to offer heaters that assure constant and efficient hot water service.

Engineers feel safe in specifying "SIMS" because they know it means **reliability**—a service you want to render your client.

SIMS CLEAN E-Z STEAM TUBE STORAGE HEATER

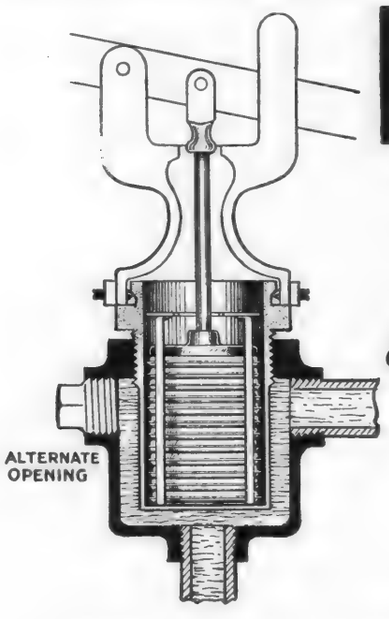
Our Engineers will gladly confer with you, without obligation, on your hot water problems.

THE SIMS CO.

Erie, Pa.

A good place to live, to work and to play.

A New Fitting!



THIS new special fitting—shown in black—simplifies the installations of the Type F Regulator.

Type F Damper Regulator is always required to properly complete a Hot Water installation, just as a regulator is standard trimming on a steam boiler.

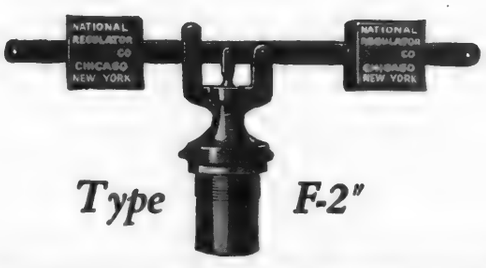
METAPHRAM DAMPER REGULATOR

A sensitive but powerful device that makes a Hot Water plant more efficient, more satisfactory—and more profitable.

Metaphram is the trade name of the metal diaphrams which form the sensitive element in our regulators. These Metaphrams are separable, with "cage assembly" and may be lifted, as a unit, from the dry well in which they operate, should replacement be necessary. The well is placed in a 2-inch opening in boiler when available or installed in pipe line. The new special fitting simplifies installation in old work.

Specify Type F fitting when wanted.

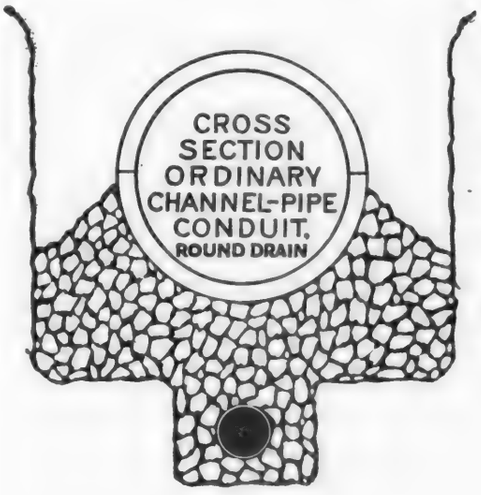
Order Type F Regulator and Type F fitting from your jobber or direct. Circular on request.



Type F-2"

NATIONAL REGULATOR CO.
2301 KNOX AVENUE CHICAGO

European Office: A. J. Assheton, 18 St. Thomas St., London, S.E.1, Eng.

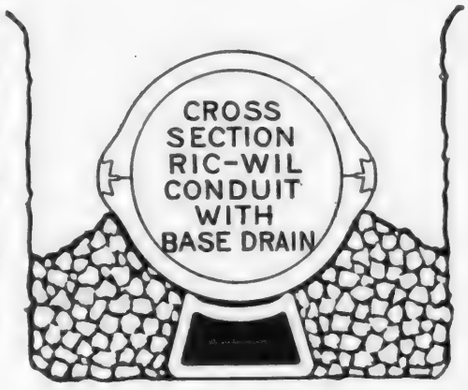


Besides extra strength, Ric-wiL assures immediate drainage that won't fail, because of Ric-wiL Base Drain close under the conduit.

It assures a water-tight conduit because of the Loc-liP Side Joints.

And it is so economical in installation that its final cost is less than that of ordinary conduit.

Compare Ric-wiL with any system.



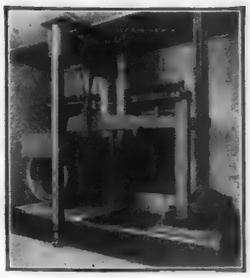
Ric-wiL is 40% Stronger

RIC-WIL Conduit has a strength 40% greater than ordinary conduit with common round drain.

This is proved by tests just completed, in which over 1000 ft. of conduit of all sizes was tested with the Ames Iowa College Standard Machine (senior size).

In every one of a wide variety of comparative tests Ric-wiL's superior strength was clearly demonstrated.

This strength means a 40% greater certainty of an intact, dry, efficient installation, insuring the profit of your client's investment in underground conduit. And it does not cost him one extra cent.



This is the Ames Iowa College Standard Machine for testing tile pipe. Its operation was strictly governed by exact instructions from the College Engineering Department. Nearly four months were spent in making the tests.

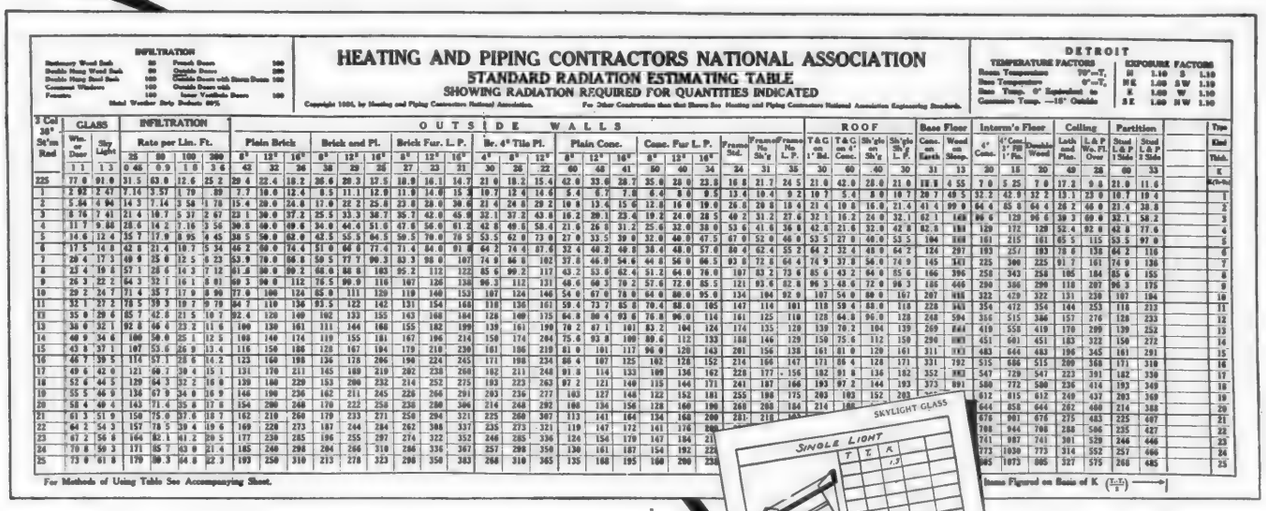
We'll be glad to give you the details of these tests if you will write

THE RIC-WIL COMPANY, CLEVELAND, OHIO

RIC-WIL

UNDERGROUND CONDUIT

Save Your Time and Money



INFILTRATION

Stationary Wood Sash	80	French Doors	100
Double Hung Wood Sash	90	Outside Doors	100
Double Hung Steel Sash	100	Outside Doors with Storm Doors	100
Casement Windows	100	Outside Doors with	
Fireside	100	Inner Vestibule Doors	100

Wind Weather Belt Reduce 60%

HEATING AND PIPING CONTRACTORS NATIONAL ASSOCIATION

STANDARD RADIATION ESTIMATING TABLE

SHOWING RADIATION REQUIRED FOR QUANTITIES INDICATED

Copyright 1926, by Heating and Piping Contractors National Association. For Other Construction than that Shown See Heating and Piping Contractors National Association Engineering Standards.

DETROIT

TEMPERATURE FACTORS: Room Temperature 70°=T, Zero Temperature 0°=T, Zero Temp. 0° Equivalent to Commerce Temp. −10° Outside

EXPOSURE FACTORS: N 1.10, S 1.10, NE 1.00, SW 1.10, E 1.00, W 1.10, SE 1.00, NW 1.10

3 Col 36" 54'm Rad	GLASS		INFILTRATION				OUTSIDE WALLS																		ROOF				Base Floor		Interm's Floor		Ceiling		Partition			Type
	Win. or Door	Sky Light	Rate per Lin. Ft.				Plain Brick			Brick and Pl.			Brick Fur. L. P.			Br. 4" Tile Pl.			Plain Conc.			Conc. Fur L. P.			Frame Std.	Frame No Sh'g	Frame No L. P.	T&G on 1" Bd.	T&G on 4" Conc.	Sh'gle on Sh'g	Sh'gle Sh'g L. F.	Conc. on Earth	Wood on Sleep.	4" Conc.	4"Conc. 1" Fill 1" Fin.	Double Wood	Lath and Plas.	L. & P. Wo. Fl. Over	Stud L.&P 1 Side	Stud L.&P 2 Side		Kind	
			25	50	100	300	8"	12"	16"	8"	12"	16"	8"	12"	16"	4"	8"	12"	8"	12"	16"	8"	12"	16"																Thick.
	1 1	1 3	0 46	0 9	1 0	3 6	42	32	26	38	29	25	37	23	21	30	26	22	60	46	41	50	40	34	34	31	28	30	60	40	30	31	13	20	15	20	49	28	60	33		K
225	77 0	91 0	31 5	63 0	12 6	25 2	29 4	22 4	18 2	26 6	20 3	17 5	18 9	16 1	14 7	21 0	18 2	15 4	42 0	33 6	28 7	35 6	28 0	23 8	16 8	21 7	24 5	21 0	42 0	28 0	21 0	18 8	4 55	3 0	5 25	3 0	17 2	9 8	21 0	11 6		Kc/h-ft2
1	2 02	2 47	7 14	3 57	1 79	89	7 7	10 0	12 4	8 5	11 1	12 0	11 9	14 0	15 2	10 7	12 4	14 6	5 4	6 7	7 8	6 4	8 0	9 5	13 4	10 4	9 2	10 7	5 4	8 0	10 7	20 7	48 5	52 2	42 9	32 2	13 1	23 0	10 7	19 4		1
2	5 64	6 94	14 3	7 14	3 58	1 78	15 4	20 0	24 8	17 0	22 2	25 8	23 8	28 0	30 6	21 4	24 8	29 2	10 8	13 4	15 6	12 8	16 0	19 0	26 8	20 8	18 4	21 4	10 8	16 0	21 4	41 4	99 0	64 4	85 8	64 4	26 2	46 0	21 4	38 8		2
3	8 76	7 41	21 4	10 7	5 37	2 67	23 1	30 0	37 2	25 5	33 3	38 7	35 7	42 0	45 9	32 1	37 2	43 8	16 2	20 1	23 4	19 2	24 0	28 5	40 2	31 2	27 6	32 1	16 2	24 0	32 1	62 1	148	96 6	129	96 6	39 3	69 0	32 1	58 2		3
4	11 7	9 88	28 6	14 2	7 16	3 56	30 8	40 0	49 6	34 0	44 4	51 6	47 6	56 0	61 2	42 8	49 6	58 4	21 6	26 8	31 2	25 6	32 0	38 0	53 6	41 6	36 8	42 8	21 6	32 0	42 8	82 8	198	129	172	128	52 4	92 0	42 8	77 6		4
5	14 6	12 4	35 7	17 8	8 95	4 45	38 5	50 0	62 0	42 5	55 5	64 5	59 5	70 0	76 2	53 5	62 0	73 0	27 0	33 5	39 0	32 0	40 0	47 5	67 0	52 0	46 0	53 5	27 0	40 0	53 5	104	248	161	215	161	65 5	115	53 5	97 0		5
6	17 5	14 8	42 8	21 4	10 7	5 34	46 2	60 0	74 4	51 0	66 6	77 4	71 4	84 0	91 8	64 2	74 4	87 6	32 4	40 2	46 8	38 4	48 0	57 0	80 4	62 4	55 2	64 2	32 4	48 0	64 2	124	297	193	257	193	78 6	138	64 2	116		6
7	20 4	17 3	49 9	25 0	12 5	6 23	53 9	70 0	86 8	59 5	77 7	90 3	83 3	98 0	107	74 9	86 8	102	37 8	46 9	54 6	44 8	56 0	66 5	93 8	72 8	64 4	74 9	37 8	56 0	74 9	145	343	225	300	225	91 7	161	74 9	136		7
8	23 4	19 8	57 1	28 6	14 3	7 12	61 8	80 0	99 2	68 0	88 8	103	95 2	112	122	85 6	99 2	117	43 2	53 6	62 4	51 2	64 0	76 0	107	83 2	73 6	85 6	43 2	64 0	85 6	166	396	258	343	258	105	184	85 6	155		8
9	26 3	22 3	64 3	32 1	16 1	8 01	69 3	90 0	112	76 5	99 9	116	107	126	138	96 3	112	131	48 6	60 3	70 2	57 6	72 0	85 5	121	93 6	82 8	96 3	48 6	72 0	96 3	185	446	290	386	290	118	207	96 3	175		9
10	29 2	24 7	71 4	35 7	17 9	8 90	77 0	100	124	85 0	111	129	119	140	153	107	124	146	54 0	67 0	78 0	64 0	80 0	95 0	134	104	92 0	107	54 0	80 0	107	207	495	322	429	322	131	230	107	194		10
11	32 1	27 2	78 5	39 3	19 7	9 79	84 7	110	136	93 5	122	142	131	154	168	118	136	161	59 4	73 7	85 8	70 4	88 0	105	147	114	101	118	59 4	88 0	118	228	545	354	472	354	144	253	118	213		11
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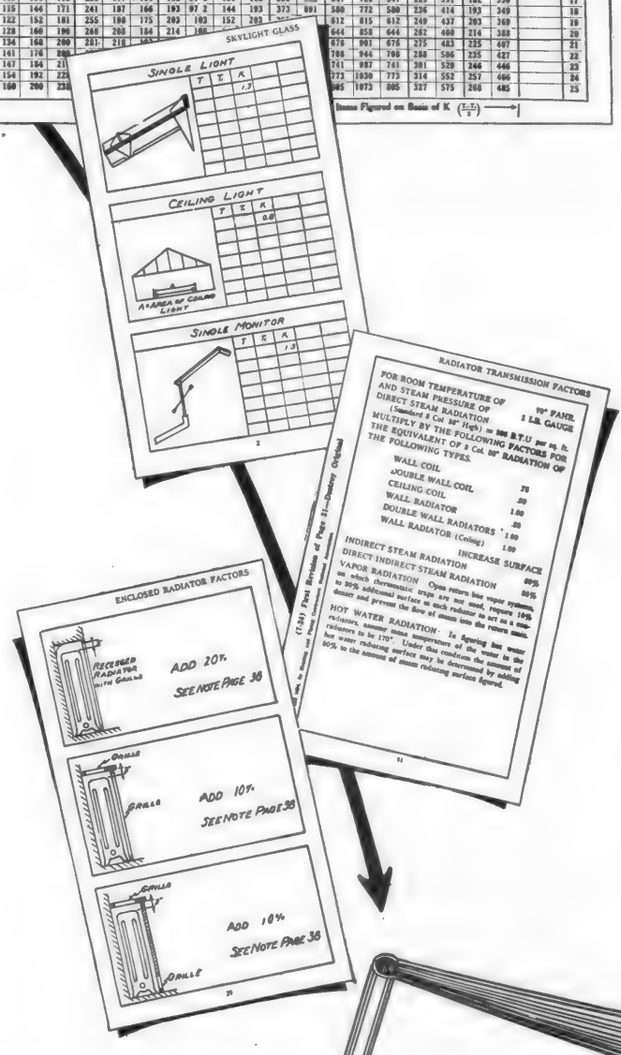
14	40 9	34 6	100	50 0	25 1	12 5	108	140	174	119	155	181	167	196	214	150	174	204	75 6	93 8	109	89 6	112	133	188	146	129	150	75 6	112	150	290	693	451	601	451	183	322	150	272		14
15	43 8	37 1	107	53 6	26 9	13 4	116	150	186	128	167	194	179	210	230	161	186	219	81 0	101	117	96 0	120	143	201	156	138	161	81 0	120	161	311	743	483	644	483	196	345	161	291		15
16	46 7	39 5	114	57 1	28 6	14 2	123	160	198	136	178	206	190	224	245	171	198	234	86 4	107	125	102	128	152	214	166	147	171	86 4	128	171	331	792	515	686	515	209	368	171	310		16
17	49 6	42 0	121	60 7	30 4	15 1	131	170	211	145	189	219	202	238	260	182	211	248	91 8	114	133	109	136	162	228	177	156	182	91 8	136	182	352	842	547	729	547	223	391	182	330		17
18	52 6	44 5	129	64 3	32 2	16 0	139	180	229	153	200	232	214	252	275	193	223	263	97 2	121	140	115	144	171	241	187	166	193	97 2	144	193	373	891	580	772	580	236	414	193	349		18
19	55 5	46 9	136	67 9	34 0	16 9	146	190	236	162	211	245	226	266	291	203	236	277	103	127	148	122	152	181	255	198	175	203	103	152	203			612	815	612	249	437	203	369		19
20	58 4	49 4	143	71 6	35 8	17 8	154	200	248	170	222	256	238	280	306	214	248	292	108	134	156	128	160	190	268	208	184	214	108	160	214			644	858	644	262	460	214	388		20
21	61 3	51 9	150	75 0	37 6	18 7	162	210	260	179	233	271	250	294	321	225	260	307	113	141	164	134	168	200	281	218	193							676	901	676	275	483	225	407		21
22	64 2	54 3	157	78 5	39 4	19 6	169	220	273	187	244	284	262	308	337	235	273	321	119	147	172	141	176	209										708	944	708	288	506	235	427		22
23	67 2	56 8	164	82 1	41 2	20 5	177	230	285	196	255	297	274	322	352	246	285	336	126	154	179	147	184	219										741	987	741	301	529	246	446		23
24	70 0	59 3	171	85 7	43 0	21 4	185	240	298	204	266	310	286	336	367	257	298	350	130	161	187	154	192	228										773	1030	773	314	552	257	466		24
25	73 0	61 8	179	89 3	44 8	22 3	193	250	310	213	278	323	298	350	383	268	310	365	135	168	195	160	200	238										845	1073	805	327	575	268	485		25

For Methods of Using Table See Accompanying Sheet.

Items Figured on Basis of K $\left(\frac{T-T_0}{T}\right)$



Be Absolutely Sure Your Radiation Estimate Is Correct

"Engineering Standards," the book on radiation, compiled and published by the Heating and Piping Contractors National Association takes the guesswork out of Radiation Estimating.

It is a reliable guide that thousands of heating contractors are using. It reduces radiation estimating to a science, with a series of tables including 151 constants for various types of construction and thickness of wall, also infiltration and exposure factors.

Standard Radiation Estimating Tables for the twenty-four cities listed below are available in addition to this comprehensive book:

Birmingham, Ala.	**Memphis, Tenn.**
Boston, Mass.	**Milwaukee, Wis.**
Buffalo, N. Y.	**New York, N. Y.**
Chicago, Ill.	**Philadelphia, Pa.**
Cincinnati, Ohio	**Pittsburgh, Pa.**
Cleveland, Ohio	**Portland, Ore.**
Detroit, Mich.	**Salt Lake City, Utah**
Denver, Colo.	**San Antonio, Texas**
Eastport, Me.	**San Francisco, Cal.**
Kansas City, Mo.	**St. Louis, Mo.**
Los Angeles, Cal.	**St. Paul, Minn.**
Madison, Wis.	**Washington, D. C.**

The Heating and Piping Contractors National Association, now in its 37th year, comprises America's leaders in heating and piping work. "Engineering Standards" is a notable example of the beneficial work of that organization.

The complete work in a loose-leaf binder may be obtained by readers of this magazine for $5.00—a cost which is small compared with the money and time it will save you in correctly estimating radiation.

HEATING AND VENTILATING MAGAZINE,
1123 Broadway, New York, N. Y.

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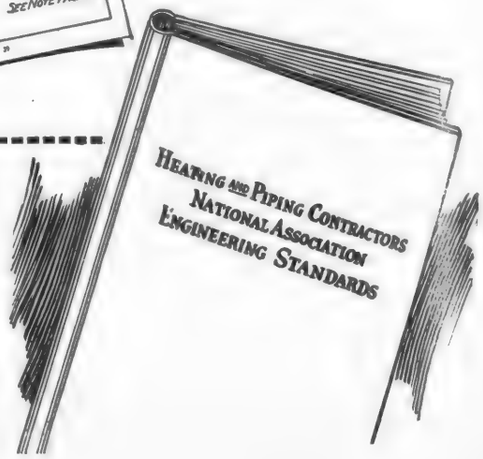

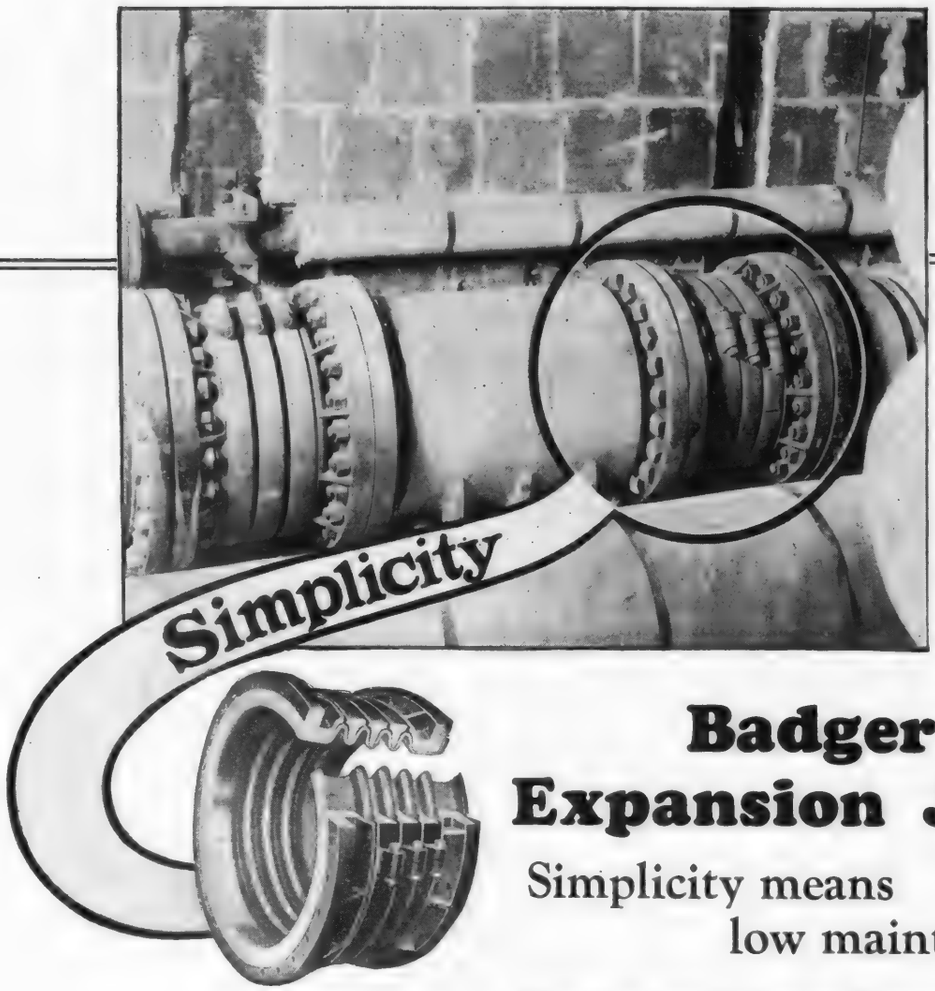

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Badger engineers are designers, manufacturers and installation experts for the following and kindred power plant products:

Spray Cooling Ponds
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ENGINEERS' SPECIFICATION INDEX

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Janette Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Powers Regulator Co., Chicago, Ill.

AIR CONDITIONING APPARATUS.
Air Conditioning & Engineering Co., St. Louis, Mo.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N.J.
Clarage Fan Co., Kalamazoo, Mich.
Drying Systems, Inc., Chicago, Ill.
Fleisher Co., Inc., W. L. New York.
Games Slayter, Lafayette, Ind.
Grinnell Company, Providence, R. I.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
Midwest Air Filters, Inc., New York.
New York Blower Co., Chicago, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.

AIR COOLING AND DRYING SYSTEMS.
Aerofin Corp., Newark, N. J.
Autovent Fan & Blower Co., Chicago, Ill.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N.J.
Clarage Fan Co., Kalamazoo, Mich.
Cooling Tower Co., New York.
Drying Systems, Inc., Chicago, Ill.
Fleisher Co., Inc., W. L., New York
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
Midwest Air Filters, Inc., New York.
New York Blower Co., Chicago, Ill.
Schutte & Koerting Co., Philadelphia, Pa.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Spray Engineering Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

AIR ELIMINATORS.
Jas. P. Marsh & Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Midwest Air Filters, Inc., New York.

AIR FILTERS.
Badger & Sons Co., E. B., Boston, Mass.
Cooling Tower Co., New York.
Drying Systems, Inc., Chicago, Ill.
Duro Air Filter Co., Chicago, Ill.
General Air Filters Corp., New York.
Midwest Air Filters, Inc., New York.
National Air Filter Co., Chicago, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Spray Engineering Co., Boston, Mass.

AIR SEPARATORS.
Griscom-Russell Co., New York.
Hoffman Specialty Co., New York.

AIR WASHERS.
American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Mfg. Co., Milwaukee, Wis.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Cooling Tower Co., Inc., New York.
Fleisher Co., Inc., W. L. New York.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Reed Air Filter Co., Inc., Louisville, Ky.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

BLOWERS
Fan.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, Ohio.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

Pressure.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.

Rotary.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Turbine.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.

BLOW OFF BASINS.
Cast Iron.
Inland Iron Works, Joliet, Ill.

BOILER CEMENT.
Johns-Manville, Inc., New York.

BOILER COMPOUNDS
Vinco Company, Inc., New York.

BOILERS.
Down-Draft.
American Radiator Co., Chicago, Ill.
Brownell Co., The, Dayton, O.
General Boilers Co., Waukegan, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Kewanee Boiler Co., Kewanee, Ill.
Molby Boiler Co., New York.
Page Boiler Co., Wm. H., New York.
Pierce, Butler & Pierce Mfg. Co., New York.
Richmond Radiator Co., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works, Titusville, Pa.
Universal Smokeless Boiler Co., Ravenna, Ohio.

Gas Fired
American Gas Products Corp., New York.
Evenheat Mfg. Co., Chicago, Ill.
Ofeldt Gas Boiler Sales Corp, Chicago, Ill.

Heating.
American Radiator Co., Chicago, Ill.
Brownell Co., The, Dayton, O.
Burnham Boiler Corp., Irvington, N. Y.
Continental Heater Corp., Dunkirk, N. Y.
Evenheat Mfg. Co., Chicago, Ill.
Fitzgibbons Boiler Co., New York.
Frost Mfg. Co., Chicago, Ill.
General Boilers Co., Waukegan, Ill.
Gorton & Lidgerwood Co., New York.
Grinnell Company, Providence, R. I.
Gurney Heater Mfg. Co., Boston, Mass.
Heggie Simplex Boiler Co., Joliet, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Kewanee Boiler Co., Kewanee, Ill.
Lebanon Boiler Works, Lebanon, Pa.
Molby Boiler Co., New York.
National Radiator Co., Johnstown, Pa.
Newport Boiler Co., Chicago, Ill.
Niagara Radiator & Boiler Co., North Tonawanda, N. Y.
Page Boiler Co., Wm. H., New York
Pierce, Butler & Pierce Mfg. Co., New York.
Richmond Radiator Co., New York.
Standard Heater Co., Williamsport, Pa.
Stanwood Corporation, Cincinnati, Ohio.
Thatcher Co., Newark, N. J.
Titusville Iron Works, Titusville, Pa.
United States Radiator Corp., Detroit, Mich.
Universal Smokeless Boiler Co., Ravenna, Ohio.
Utica Heater Co., Utica, N. Y.
Weil-McLain Co., Chicago, Ill.

Power.
Fitzgibbons Boiler Co., New York.
Frost Mfg. Co., Chicago, Ill.
Heggie Simplex Boiler Co., Joliet, Ill.
Kewanee Boiler Co., Kewanee, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Stanwood Corporation, Cincinnati, Ohio.
Titusville Iron Works Co., Titusville, Pa.

CALORIMETERS.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Sarco Co., New York.

COILS, PIPE.
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Pecco, Inc., St. Louis, Mo.
Whitlock Coil Pipe Co., Hartford, Conn.

Air.
New York Blower Co., Chicago, Ill.

CONCRETE INSERTS
Frank Radiator Bracket Co., Chicago, Ill.
Little Giant Mfg. Co., Minneapolis, Minn.

CONDENSERS.
Alberger Heater Co., Buffalo, N. Y.
American Radiator Co., Chicago, Ill.
American Steam Pump Co., Battle Creek, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Whitlock Coil Pipe Co., Hartford, Conn.

CONVERTERS, HOT WATER.
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Frank Heating & Engineering Co., O. E., Buffalo, N. Y.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co. Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.
Wyckoff & Son Co., A., Elmira, N. Y.

COOLERS.
Oil.
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

COOLING PLANTS & PONDS
Spray Engineering Co., Boston, Mass.

COOLING TOWERS.
Badger & Sons Co., E. B., Boston, Mass.
Cooling Tower Co., New York.

COPPER BOILERS.
Badger & Sons Co., E. B., Boston, Mass.
Dahlquist Mfg. Co., Boston, Mass.

COPPER KETTLES.
Badger & Sons Co., E. B., Boston, Mass.
Dahlquist Mfg. Co., Boston, Mass.

COVERING PIPE.
American District Steam Co., No. Tonawanda, N. Y.
Hornung, J. C., Chicago, Ill.
Johns-Manville Inc., New York.
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Wyckoff & Son Co., A, Elmira, N. Y.

DAMPERS, DUCT.
American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, O.
York Heating & Ventilating Co., Philadelphia, Pa

DEHUMIDIFYING APPARATUS.
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Engineering Corp., Newark, N. J.
Cooling Tower Co., New York.
Fleisher Co., Inc., W. L., New York.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

DISTILLERS, (Water).
Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co. Inc., Buffalo, N. Y

DRAFT APPLIANCES.
Wolff Coal Saver Co., Chicago, Ill.

DRYING SYSTEMS.
(See Air Cooling and Drying Systems.)

DUST COLLECTING SYSTEMS.
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, New York.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
York Heating & Ventilating Co., Philadelphia, Pa

DUST COLLECTORS.
American Blower Co., Detroit, Mich.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Co., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F. Hyde Park, Mass.
York Heating & Ventilating Co., Philadelphia, Pa

ENGINES.
Steam, Automatic.
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Stanwood Corporation, Cincinnati, Ohio.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Steam, High Speed.
American Blower Co., Detroit, Mich.
Brownell Co., The, Dayton, O.
Clarage Fan Co., Kalamazoo, Mich.
New York Blower Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Sturtevant Co., B. F., Hyde Park, Mass.

EQUALIZING LOOPS.
Hoffman Specialty Co., New York.

EVAPORATORS.
Boiler Feed Make-Up.
Badger & Sons Co., E. B., Boston, Mass.
Davis Engineering Co., New York.
Griscom-Russell Co., New York.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y
Whitlock Coil Pipe Co., Hartford, Conn.

YOUNG

CENTRIFUGAL
VACUUM
PRESSURE
PUMPS

CENTRIFUGAL VACUUM AND BOILER FEED

Supplied in Standard Units of Seven Capacities

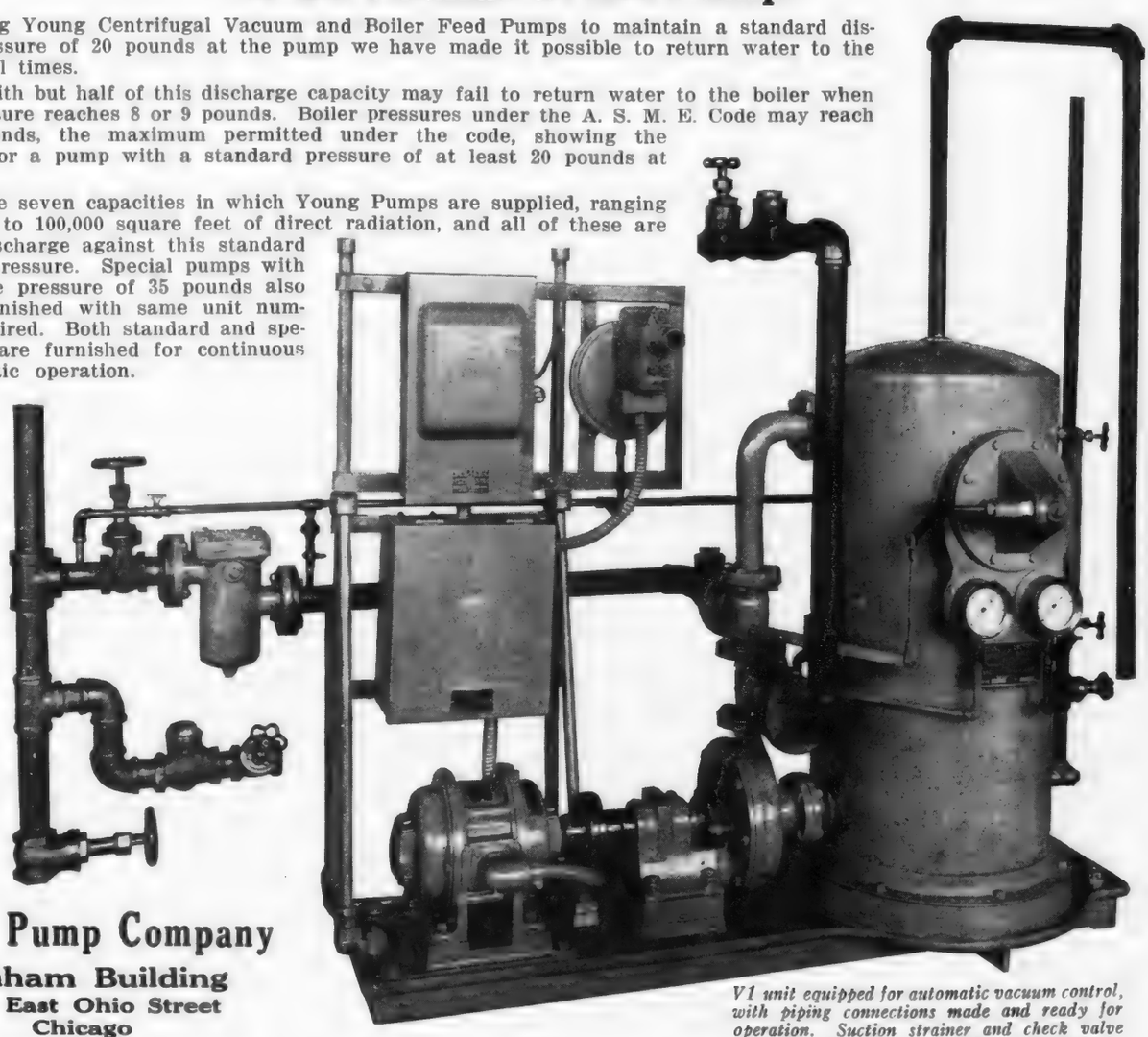
PUMPS

Young Pumps Have a Standard Discharge Pressure of 20 Pounds at the Pump

In designing Young Centrifugal Vacuum and Boiler Feed Pumps to maintain a standard discharge pressure of 20 pounds at the pump we have made it possible to return water to the boiler at all times.

Pumps with but half of this discharge capacity may fail to return water to the boiler when boiler pressure reaches 8 or 9 pounds. Boiler pressures under the A. S. M. E. Code may reach fifteen pounds, the maximum permitted under the code, showing the necessity for a pump with a standard pressure of at least 20 pounds at the pump.

There are seven capacities in which Young Pumps are supplied, ranging from 5,000 to 100,000 square feet of direct radiation, and all of these are built to discharge against this standard 20 pound pressure. Special pumps with a discharge pressure of 35 pounds also can be furnished with same unit numbers, if desired. Both standard and special units are furnished for continuous or automatic operation.



V1 unit equipped for automatic vacuum control, with piping connections made and ready for operation. Suction strainer and check valve at inlet of pump are furnished with unit, as well as companion flanges, bolts and gaskets.

Young Pump Company
Dunham Building
450 East Ohio Street
Chicago
Factory: MICHIGAN CITY, IND.

YOUNG PUMP COMPANY

ENGINEERS' SPECIFICATION INDEX (Continued)

EXHAUST HEADS.
Aeolus Dickinson Co., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass
Wright-Austin Co., Detroit, Mich.

EXHAUST SYSTEMS.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N Y.
Ilg Electric Ventilating Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Wing Mfg. Co., L. J., New York.
York Heating & Ventilating Co., Philadelphia, Pa

EXPANSION JOINTS.
American District Steam Co., No. Tonawanda, N. Y.
Badger & Sons Co., E. B., Boston, Mass.
Central Station Steam Co., Detroit, Mich.
Dahlquist Mfg. Co., Boston, Mass.
Griscom-Russell Co., New York.
Hornung, J. C., Chicago, Ill.
Howard Iron Works, Buffalo, N. Y.
Illinois Engineering Co., Chicago, Ill.
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Webster & Co., Warren, Camden, N. J.
Wheeler Condenser & Engineering Co., Carteret, N. J.

EXPANSION SHELLS
Phillips Drill Co., Chicago, Ill.

FANS, EXHAUST.
Amercan Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
DeBothezat Impeller Co., Inc., New York.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa.

FEEDERS
Boiler
Kieley & Mueller, Inc., New York.
McDonnell & Miller, Chicago, Ill.

FILTERS, (Aerating).
Davis Engineering Corp., New York.
Griscom-Russell Co., New York.

Feed-Water.
Davis Engineering Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.

FITTINGS, FLANGED.
American District Steam Co., No. Tonawanda, N. Y.
Clow and Sons, Jas. B., Chicago, Ill.
Grinnell Company, Providence, R. I.

FLANGES.
American District Steam Co., No. Tonawanda, N. Y.
Jenkins Bros., New York.

GAS BURNERS
Cleveland Gas Burner & Appliance Co., Cleveland, Ohio.

GASKETS, METALLIC.
Sarco Co., New York.

GAUGE BOARDS.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Webster & Co., Warren, Camden, N. J.

GAUGES.
Altitude
Pierce, Butler & Pierce Mfg. Co., New York.

Draft.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Hydraulic.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.

Ounce Graduated.
Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.

Pressure.
American Dist. Steam Co., North Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Pierce, Butler & Pierce Mfg. Co., New York.
Webster & Co., Warren, Camden, N. J.

Vacuum.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The, Foxboro, Mass.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.
Webster & Co., Warren, Camden, N. J.

Vacuum (Compound).
Cashin Co., W. D., Boston, Mass.
Pierce, Butler & Pierce Mfg. Co., New York.

Water.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenburg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Bristol Co., Waterbury, Conn.
Jenkins Bros., New York.

GENERATOR COOLING SYSTEMS.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Cooling Tower Co., New York.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

GOVERNORS, (Pump).
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.
Westinghouse Elec. &. Mfg. Co., East Pittsburgh, Pa.
Wright-Austin Co., Detroit, Mich.

GRATES
Dumping
Pyramid Iron Products Co., New York.

Rocking
Pyramid Iron Products Co., New York.

Shaking
Pyramid Iron Products Co., New York.

Shaking and Dumping
Pyramid Iron Products Co., New York.

Shaking, Circular
Pyramid Iron Products Co., New York.

Stationary
Pyramid Iron Products Co., New York.

HEAT CABINETS
Trane Co., LaCross, Wis.

HEATERS.
Domestic Water.
Alberger Heater Co., Buffalo, N. Y.
American District Steam Co., No. Tonawanda, N. Y.
American Radiator Co., Chicago, Ill.
Badger & Sons Co., E. B., Boston, Mass.
Burnham Boiler Corp., Irvington, N. Y.
Dahlquist Mfg. Co., Boston, Mass.
Davis Engineering Co., New York.
Excelso Specialty Works, Buffalo, N. Y.
Frank Heating & Engineering Co., O. E., Buffalo, N. Y.
National Pipe Bending Co., New Haven, Conn.
Page Boiler Co., Wm. H., New York.
Patterson-Kelley Co., New York.
Pierce, Butler & Pierce Mfg. Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Standard Heater Co., Williamsport, Pa.
Thermal Appliance Co., New York.
Whitlock Coil Pipe Co., Hartford, Conn.

Electrical Unit
Ilg Electric Ventilating Co., Chicago, Ill.

Feed Water, (Closed).
Alberger Heater Co., Buffalo, N. Y.
Davis Engineering Co., New York.
Frank Heating & Engineering Co., O. E., Buffalo, N. Y.
Griscom-Russell Co., New York.
McAlear Mfg. Co., Chicago, Ill.
National Pipe Bending Co., New Haven, Conn.
Patterson-Kelley Co., New York.
Ross Heater & Mfg. Co., Buffalo, N. Y.
Sims Co., Erie, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Whitlock Coil Pipe Co., Hartford, Conn.

Feed Water, (Open).
Griscom-Russell Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.

Fuel-oil.
Alberger Heater Co., Buffalo, N. Y.
American Blower Co., Detroit, Mich.
Davis Engineering Corp., New York.
Drying Systems, Inc., Chicago, Ill.
Griscom-Russell Co., New York.
National Pipe Bending Co., New Haven, Conn.
Ross Heater & Mfg. Inc., Buffalo, N. Y.
Whitlock Coil Pipe Co., Hartford, Conn.

Air, Fan System.
Aerofin Corporation, Newark, N. J.
American Blower Co., Detroit, Mich.
American Radiator Co., Chicago, Ill.
Autovent Fan & Blower Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Clarage Fan Co., Kalamazoo, Mich.
Drying Systems, Inc., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass
Modine Mfg. Co., Racine, Wis.
New York Blower Co., Chicago, Ill.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Sturtevant Co., B. F., Hyde Park, Mass.

Magazine Feed
Standard Heater Co., Williamsport, Pa.

Portable Unit Air.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill.
Buffalo Forge Co., Buffalo, N. Y.
Dwyer Equipment Co., Chicago, Ill.
Ilg Electric Ventilating Co., Chicago, Ill.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Pecco Incorporated, St. Louis, Mo.
Skinner Bros. Co., St. Louis, Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa
(See also Ventilators, Portable Unit.)

HEATING SYSTEMS.
"Gasteam".
James B. Clow & Sons, Chicago, Ill.

Vacuum.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Standard Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind
Webster & Co., Warren, Camden, N. J.

Vapor.
American District Steam Co., No. Tonawanda N. Y.
Barnes & Jones, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Gorton & Lidgerwood Co., New York.
Grinnell Company, Providence, R. I.
Haines & Co., Wm. S., Philadelphia, Pa.
Ideal Heating Equip. Co., Cleveland, Ohio
Illinois Engineering Co., Chicago, Ill.
Illinois Malleable Iron Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mount Vapor Heating Co., Cleveland, O
Nelson Corporation, Herman, Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Sarco Co., New York.
Simplex Heating Specialty Co., Inc., Lynchburg, Va.
Standard Heater Co., Williamsport, Pa.
Sterling Engineering Co., Milwaukee, Wis
Trane & Co., La Crosse, Wis.
Vapor Engineering Co., New York.
Webster & Co., Warren, Camden, N. J.

Water.
Grinnell Company, Providence, R. I.
Patterson-Kelley Co., New York.
Standard Heater Co., Williamsport, Pa.
Thrush & Co., H. A., Peru, Ind.

HUMIDIFIERS
American Blower Co., Detroit, Mich.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N. J
Drying Systems, Inc., Chicago, Ill.
Grinnell Company, Providence, R. I.
Massachusetts Blower Co., Watertown, Mass
New York Blower Co., Chicago, Ill.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.

HUMIDITY CONTROL.
American Blower Co., Detroit, Mich.
Atlas Valve Co., Newark, N. J.
Bayley Mfg. Co., Milwaukee, Wis.
Carrier Air Conditioning Co., of America, Buffalo, N. Y.
Carrier Engineering Corp., Newark, N. J.
Drying Systems, Inc., Chicago, Ill.
Foxboro Co., Inc., The Foxboro, Mass.
Grinnell Company, Providence, R. I.
Massachusetts Blower Co., Watertown, Mass
New York Blower Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.

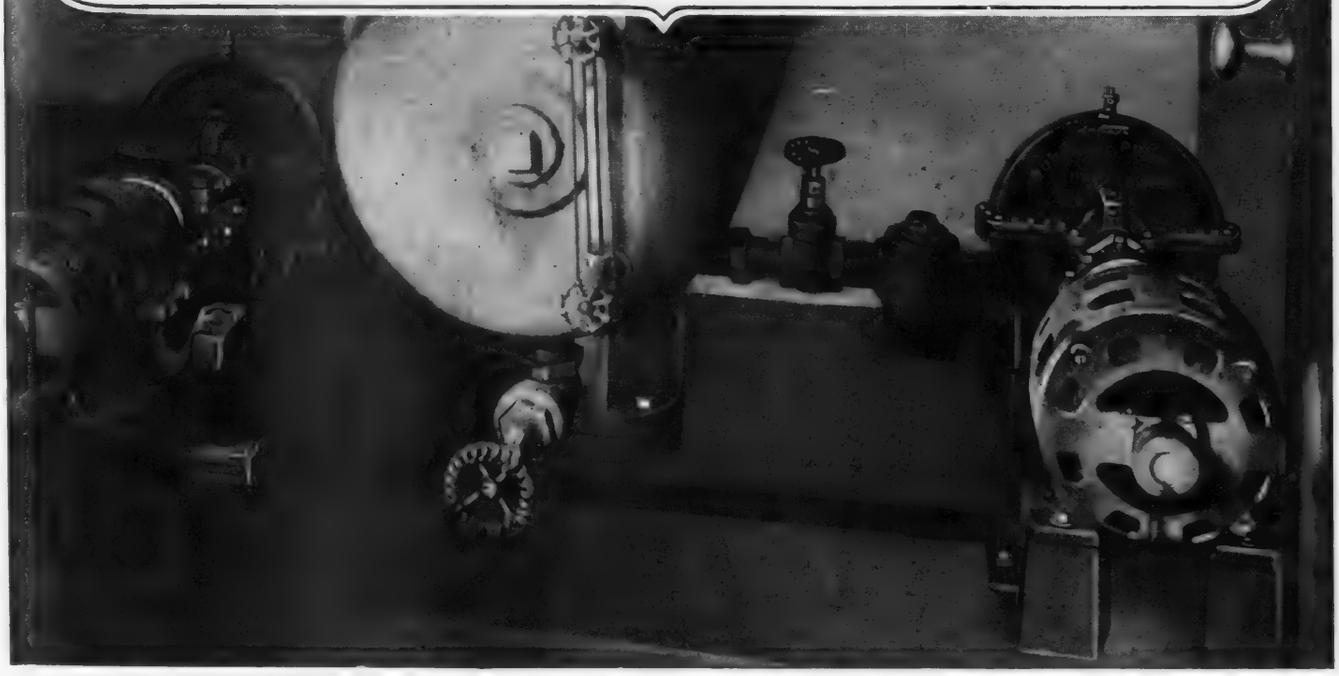
INSTRUMENTS
Electric Measuring.
Bristol Co., Waterbury, Conn.
Westinghouse Electric & Mfg. Co., East Pittsburg, Pa.

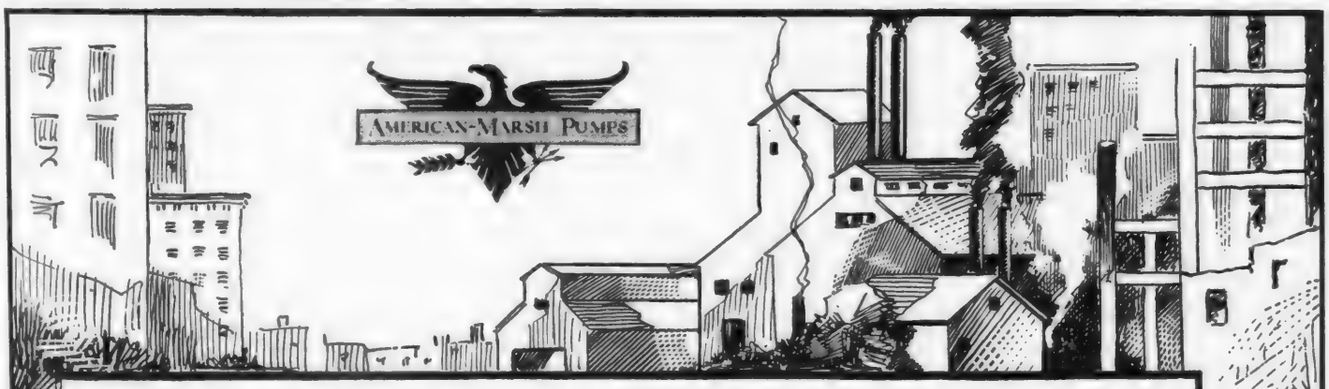
Indicating and Recording.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Bailey Meter Co., Cleveland, O.
Foxboro Co., Inc., The Foxboro, Mass.

"Buffalo" pumps for heating systems—

If you want to be able to install pumps with a heating system—and then forget about them—use Buffalo Class "S" or "SL". The largest companies find that the features of "Buffalo" construction save money for them. Why not get full information, Now?

BUFFALO STEAM PUMP COMPANY
480 BROADWAY, BUFFALO, NEW YORK.
In Canada: Canadian Blower & Forge Company, Ltd., Kitchener, Ont.





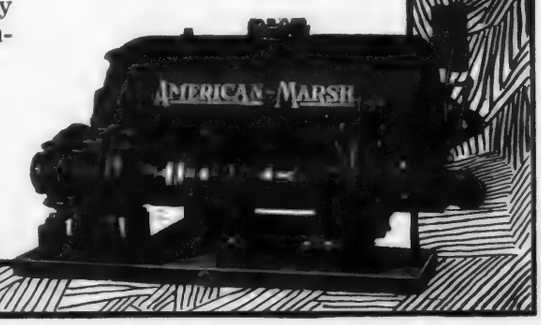
For Low Pressure Heating Systems

American-Marsh Condensation Pumps

In every instance where the installation is American-Marsh Pumps, there you will find satisfactory service.

The centrifugal automatic Boiler Feed Pump and Receiver is the practical pump for low pressure heating systems, where the condensation flows by gravity into the receiving tank. Made in vertical and horizontal types, for boiler pressure up to fifty pounds.

Get the installation that suits your requirements. Write for Bulletin.



American Steam Pump Company
Battle Creek, Michigan

ENGINEERS' SPECIFICATION INDEX (Continued)

Marsh & Co., Jas. P., Chicago, Ill.
Sarco Co., New York
Westinghouse Elec. & Mfg. Co., East Pittsburg, Pa

INSULATING MATERIALS.

American District Steam Co., No. Tonawanda, N. Y.
Armstrong Cork & Insulation Co., Pittsburgh, Pa.
Hornung, J. C., Chicago, Ill.
Johns-Manville, Inc., New York.
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Universal Gypsum Co., Chicago, Ill.
Wyckoff & Sons, A., Elmira, N. Y.

MANOMETERS.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.

MECHANICAL DRAFT APPARATUS.

American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, O.
Clarage Fan Co., Kalamazoo, Mich.
Massachusetts Blower Co., Watertown, Mass.
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park Mass.
L. J. Wing Co., New York.

METERS.

Condensation.

American Dist. Steam Co., No. Tonawanda, N. Y.
Central Station Steam Co., Detroit, Mich.
Hornung, J. C., Chicago, Ill.
Pearce & Co., W. H., Chicago, Ill.

Feed Water.

Central Station Steam Co., Detroit, Mich.

Feed Water (Wier Type).

Webster & Co., Warren, Camden, N. J.

Flow

American District Steam Co., North Tonawanda, N. Y.
Spray Engineering Co., Boston, Mass.

Pitot Tube.

American Blower Co., Detroit, Mich.

Steam.

American District Steam Co., No. Tonawanda, N. Y.
Foxboro Co., Inc., The Foxboro, Mass.

MOTORS (Electric).

Century Electric Co., St. Louis, Mo.
Janette Mfg. Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

NOZZLES, SPRAY

American Blower Co., Detroit, Mich.
Badger & Sons Co., E. B., Boston, Mass.
Bayley Manufacturing Co., Milwaukee, Wis.
Carrier Air Conditioning Co. of America, Buffalo, N. Y.
Carrier Engineering Co., Newark, N. J.
Clarage Fan Co., Kalamazoo, Mich.
Cooling Tower Co., New York
New York Blower Co., Chicago, Ill.
Spray Engineering Co., Boston, Mass.
Sturtevant Co., B. F., Hyde Park, Mass.

OIL BURNERS

American Nokol Co., Chicago, Ill.
Automatic Burner Corp., Chicago, Ill.
Automatic Home Heating Co., Pueblo, Colo.
Caloroil Burner Corp., New York
Chalmers Oil Burner Co., Minneapolis, Minn.
Combustion Fuel Oil Burner Co., Milwaukee, Wis.
Drying Systems, Inc., Chicago, Ill.
Electrol Incorporated, St. Louis, Mo.
Hardinge Bros., Inc., Chicago, Ill.
Johnson Co., S. T., Oakland, Cal.
Marr Oil Heat Machine Cor., Minneapolis, Minn.
May Oil Burner Corp., Baltimore, Md.
Nu-Way Corporation, Rock Island, Ill.
Rayfield Mfg. Co., Chicago, Ill.
Wilde Co., W. B., Peoria, Ill.
Winslow Boiler & Engineering Co., Chicago, Ill.

OIL BURNER ACCESSORIES

Janette Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
Monroe Machine Tool Co., Chicago, Ill.
Webster Electric Co., Racine, Wis.

OZONE APPARATUS.

Air Conditioning & Engineering Co., St. Louis, Mo.
United States Ozone Co., Scottdale, Pa.

PIPE.

Cast Iron.

Clow & Sons, Jas. B., Chicago, Ill.

Steel.

National Tube Co., Pittsburgh, Pa.

Wood.

Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE BENDING.

Badger & Sons Co., E. B., Boston, Mass.
Buffalo Forge Co., Buffalo, N. Y.
Grinnell Company, Providence, R. I.
National Pipe Bending Co., New Haven, Conn.
Whitlock Coil Pipe Co., Hartford, Conn.

PIPE CASING (Wood).

American District Steam Co., No. Tonawanda, N. Y.
Wyckoff & Sons Co., A., Elmira, N. Y.

PIPE HANGERS.

Grinnell Company, Providence, R. I.
Jenkins Bros., New York.

PIPE, POWER.

Grinnell Company, Providence, R. I.

PUMPS.

Centrifugal.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yeomans Bros. Co., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

Condensation.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Chicago Pump Co., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill.
Wright-Austin Co., Detroit, Mich.
Yeomans Bros. Co., Chicago, Ill.

Rotary.

Nash Engineering Co., So. Norwalk, Conn.

Steam.

American Steam Pump Co., Battle Creek, Mich.
Buffalo Steam Pump Co., Buffalo, N. Y.
Nash Engineering Co., So. Norwalk, Conn.

Turbine.

Nash Engineering Co., So. Norwalk, Conn.
Wheeler Condenser & Engineering Co., Carteret, N. J.
Yoemans Bros., Chicago, Ill.

Vacuum.

American Steam Pump Co., Battle Creek, Mich.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Chicago Pump Co., Chicago, Ill.
Du Moin Pump Sales Co., Des Moines, Iowa.
Economy Pumping Machinery Co., Chicago, Ill.
Janette Mfg. Co., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Nash Engineering Co., So. Norwalk, Conn.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y.
Skidmore Corp., Chicago, Ill.
Trane Co., La Crosse, Wis.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.
Yeomans Bros., Chicago, Ill.
Young Pump Co., Michigan City, Ind.

RADIATOR HANGERS.

Frank Radiator Bracket Co., Chicago, Ill.
Gloeckle, Jr., A. F., Rochester, N. Y.
Grinnell Company, Providence, R. I.
Hartmann Co., Charles, Brooklyn, N. Y.
Healy-Ruff Company, St. Paul, Minn.
Little Giant Mfg. Co., Minneapolis, Minn.
Pierce, Butler & Pierce Mfg. Co., New York.

RADIATORS.

"Gasteam."

James B. Clow & Sons, Chicago, Ill.

"Gaswater."

Clow & Sons, Jas. B., Chicago, Ill.

RADIATORS, STEAM AND WATER.

Aerofin Corp., Newark, N. J.
American Radiator Co., Chicago, Ill.
International Heater Co., Utica, N. Y.
Gurney Heater Mfg. Co., Boston, Mass.
National Radiator Co., Johnstown, Pa.
Pierce, Butler & Pierce Mfg. Co., New York.
Richmond Radiator Co., New York
Standard Heater Co., Williamsport, Pa.
United States Radiator Corp., Detroit, Mich.

RECEIVERS.

Air.

American District Steam Co., No. Tonawanda, N. Y.
The Brownell Co., Dayton, Ohio.
Kieley & Mueller, Inc., New York.
Sterling Engineering Co., Milwaukee, Wis.

Condensation.

Chicago Pump Co., Chicago, Ill.
Davis Regulator Co., G. M., Chicago, Ill.
Economy Pumping Machinery Co., Chicago, Ill
McAlear Mfg. Co., Chicago, Ill.
Yeomans Bros., Chicago, Ill.

REGULATORS.

Boiler-Feed.

Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
McDonnell & Miller, Chicago, Ill.

Damper.

American Dist. Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
American Radiator Co., Chicago, Ill.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Davis Regulator Co., G. M., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Honeywell Heating Specialties Co., Wabash, Indiana.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mueller Co., Decatur, Ill.
National Regulator Co., Chicago, Ill.
Nelson Corporation, Herman, Moline, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Thrush & Co., H. A., Peru, Ind.
Trane Co., La Crosse, Wis.
L. J. Wing Mfg. Co., New York.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Foxboro Co., Inc., The Foxboro, Mass.
Fulton Co., Knoxville, Tenn.
Honeywell Heating Specialties Co., Wabash, Indiana.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Stickle Steam Specialties Co., Indiapapolis, Ind
Thrush & Co., H. A., Peru, Ind.

Temperature.

American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Carrier Engineering Corporation, Newark, N. J
Foxboro Co., Inc., The Foxboro, Mass.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn,
Honeywell Heating Specialties Co., Wabash, Indiana.
Hornung, J. C., Chicago, Ill.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
National Regulator Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.
White Mfg. Co., St. Paul, Minn.

SEPARATORS.

Oil.

Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Stickle Steam Specialties Co., Indianapolis, Ind
Wright-Austin Co., Detroit, Mich.

Steam.

American District Steam Co., No. Tonawanda, N. Y.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Sims Co., Erie, Pa.
Stickle Steam Specialties Co., Indianapolis, Ind
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

SOUND PROOFING MATERIALS

Cork Foundation Co., New York.

SPRAY COOLING SYSTEMS.

Badger & Sons Co., E. B., Boston, Mass.
Bayley Mfg. Co., Milwaukee, Wis.
Cooling Tower Co., New York.
Massachusetts Blower Co., Watertown, Mass
Seymour, James M., Newark, N. J.

SPRAY NOZZLES

(See Nozzles, Spray)

STOKERS

CombustiKator Co., Chicago, Ill.
Domestic Stoker Co., New York.

STRAINERS.

Oil.

Griscom-Russell Co., New York.
Kieley & Mueller, Inc., New York.
Monroe Machine Tool Co., Chicago, Ill.
Ross Heater & Mfg. Co., Inc., Buffalo, N. Y

Steam.

American Dist. Steam Co., No. Tonawanda N. Y.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Mason Regular Co., Boston, Mass.
McAlear Mfg. Co., Chicago, Ill.
Sarco Co., New York.
Sterling Engineering Co, Milwaukee, Wis
Wright-Austin Co., Detroit, Mich.

Water.

American Dist. Steam Co., No. Tonawanda N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Ross Heater & Mfg. Co., Inc., Buffalo, N Y
Sarco Co., New York.
Spray Engineering Co., Boston, Mass.

THERMOMETERS.

(Recording and Indicating).

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Bristol Co., Waterbury, Conn.
Foxboro Co., Inc., The Foxboro, Mass.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.

Water.

Marsh & Co., Jas. P., Chicago, Ill.
Pierce, Butler & Pierce Mfg. Co., New York.

THERMOSTATS.

American Radiator Co., Chicago, Ill.
Atlas Valve Co., Newark, N. J.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Fulton Co., Knoxville, Tenn.
Gold Car Heating & Lighting Co., Brooklyn.

Why a Chicago?

—because our long experience in every conceivable type of pumping problem requiring judgment, skill and science, both practical and technical, enables us to offer valuable suggestions to you.

—because our ever increasing list of successful installations throughout the country in such buildings as the S. W. Straus Building, Chicago, Ill., Citizens National Bank, Baltimore, Md., The Coliseum, Los Angeles, Cal., and many others of equal prominence, show that engineers recognize the fact that they can depend upon a "Chicago" to do its work faithfully in any capacity.

—because our superior grade of workmanship and materials, prompt attention and faultless service to every client merits your confidence in our ability to serve you.

—because the prices are right.

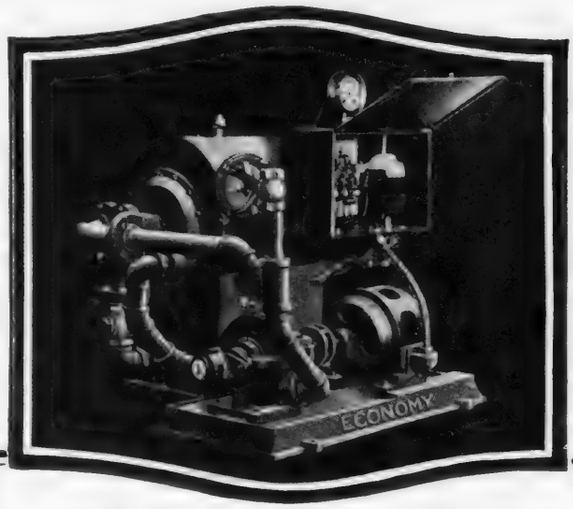
The above illustration shows the "Sure Return" condensation pump and receiver designed to return condensate from heating coils to the boiler. The "Sure Return" is made for pressure of 10 pounds at the pump and for capacities up to 10,000 square feet direct radiation. In addition to the "Sure Return" we manufacture a complete line of horizontal and vertical condensation pumps for pressure ranging from 10 to 200 pounds and in capacities from 3000 to 200,000 square feet direct radiation. Bulletin 129 fully describes this line.

Chicago Pump Company

Quality Centrifugal Pumps for Every Service

Sewage—Condensation—Circulating—Bilge
Fire—House—Vacuum

Office and Works:
2325 Wolfram St., Chicago, Ill.
Representatives in Principal Cities of United States and Foreign Countries



Type C. V. Fig. 2234—Single Model Vacuum Pumps

DEPENDABILITY

This is an essential requirement of all apparatus entering into the equipment of every worth while project.

Economy Centrifugal Vacuum Pumps

embody every requisite of high class equipment. They are well motored with ample reserve power. They never burn out, consequently shut downs are avoided.

They have ample air, water and pressure capacity.

They have longer life than other types.

They maintain their efficiencies.

They are scientifically designed.

They have the best thought of competent hydraulic and heating engineers built into them.

They require less attention and upkeep than other types.

They reduce noise in radiators and piping.

They operate quietly.

They use no more power than other pumps that do the same work.

They are guaranteed for performance and quality.

Representatives in Every Large City

Economy Pumping Machinery Co.

71-122 North Curtis St. CHICAGO

ENGINEERS' SPECIFICATION INDEX (Continued)

Honeywell Heating Specialties Co., Wabash, Indiana.
Johnson Service Co., Milwaukee, Wis.
Minneapolis Heat Regulator Co., Minneapolis, Minn.
Powers Regulator Co., Chicago, Ill.
Sarco Co., New York.
Thrush & Co., H. A., Peru, Ind.
White Mfg. Co., St. Paul, Minn.

TRAPS.

Radiator.

Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D. Boston, Mass.
Dunham, C. A., Co., Chicago, Ill.
Hoffman Specialty Co., New York.
Ideal Heating Equipment Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill.
Johns-Manville, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
Mouat Vapor Heating Co., Cleveland, O
Nelson Corporation, Herman, Moline, Ill.
O-E Specialty Co., Milwaukee, Wis.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.

Return.

American Blower Co., Detroit, Mich.
Barnes & Jones, Boston, Mass.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago Ill.
Johns-Manville, Inc., New York.
Kieley & Mueller, Inc., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Mouat Vapor Heating Co., Cleveland, O.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Simplex Heating Specialty Co., Inc., Lynchburgh, Va.
Sterling Engineering Co., Milwaukee, Wis.
Trane Co., La Crosse, Wis.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

Steam.

American Blower Co., Detroit, Mich.
American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Davis Engineering Co., New York.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johns-Manville, Inc., New York.
Kieley & Mueller, Inc., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Patterson-Kelley Co., New York.
Pearce & Co., W. H., Chicago, Ill.
Sarco Co., New York.
Stickle Steam Specialties Co., Indianapolis, Ind.
Trane Co., La Crosse, Wis.
Wright-Austin Co., Detroit, Mich.

Vacuum.

American Blower Co., Detroit, Mich.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Cashin Co., W. D., Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Hoffman Specialty Co., New York.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller, Inc., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Pearce & Co., W. H., Chicago, Ill.
Sarco Co., New York.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind.
Webster & Co., Warren, Camden, N. J.
Wright-Austin Co., Detroit, Mich.

TURBINES (Steam).

Buffalo Forge Co., Buffalo, N. Y.
Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co. East Pittsburgh, Pa.
L. J. Wing Mfg. Co., New York.

TURBO-BLOWERS.

Sturtevant Co., B. F., Hyde Park, Mass.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

UNDERGROUND PIPE CONDUITS.

American District Steam Co., No. Tonawanda, N. Y.
Hornung, P. C., Chicago, Ill.
Johns-Manville, Inc., New York
Pearce & Co., W. H., Chicago, Ill.
Ric-Wil Co., Cleveland, O.
Wyckoff & Son, A., Elmira, N. Y

VACUUM CLEANING APPARATUS.

American Radiator Co., Chicago, Ill.
Spencer Turbine Co., Hartford, Conn.
Sturtevant Co., B. F., Hyde Park, Mass.

VALVES.

Air (Automatic).

American Radiator Co., Chicago, Ill.
Commonwealth Brass Corporation, Detroit, Mich.
Fulton Co., Knoxville, Tenn.
Haines & Co., Wm. S., Philadelphia, Pa.
Hoffman Specialty Co., New York.
Jenkins Bros., New York.
Marsh & Co., Jas. P., Chicago, Ill.
McAlear Mfg. Co., Chicago, Ill.
Milwaukee Valve Co., Milwaukee, Wis.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powers Regulator Co., Chicago, Ill.
Pierce, Butler & Pierce Corp., New York.

Air Relief.

American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Barnes & Jones, Boston, Mass.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
O-E Specialty Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.
Sterling Engineering Co., Milwaukee, Wis.
Webster & Co., Warren, Camden, N. J.

Back Pressure.

Griscom-Russell Co., New York.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.
Stickle Steam Specialties Co., Indianapolis, Ind.

Balanced.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Powers Regulator Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.
Stickle Steam Specialties Co., Indianapolis, Ind.

Blow-off.

Jenkins Bros., New York.
The Wm. Powell Co., Cincinnati, O.

Check.

Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
O-E Specialty Mfg. Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

Float.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Illinois Engineering Co., Chicago, Ill.
Kieley & Mueller Co., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Stickle Steam Specialties Co., Indianapolis, Ind.

Gate.

American District Steam Co., No. Tonawanda, N. Y.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Marsh Valve Co., Erie, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Scott Valve Mfg. Co., Detroit, Mich.

Globe, Angle and Cross.

Commonwealth Brass Corp., Detroit, Mich.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Marsh Valve Co., Erie, Pa.
Milwaukee Valve Co., Milwaukee, Wis.
Pierce, Butler & Pierce Corp., New York.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Scott Valve Mfg. Co., Detroit, Mich.

Hydraulic-Operating.

Atlas Valve Co., Newark, N. J.
Kieley & Mueller, Inc., New York.

Non-Return.

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Davis Regulator Co., G. M., Chicago, Ill.
Grinnell Company, Providence, R. I.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.

Radiator.

American Radiator Co., Chicago, Ill.
American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Barnes & Jones, Boston, Mass.
Bishop & Babcock Sales Co., Cleveland, Ohio.
Commonwealth Brass Corporation, Detroit, Mich.
Dunham Co., C. A., Chicago, Ill.
Fulton Co., Knoxville, Tenn.
Gorton & Lidgerwood Co., New York.
Honeywell Heating Specialties Co., Wabash, Indiana.
Ideal Heating Equip. Co., Cleveland, Ohio.
Illinois Engineering Co., Chicago, Ill
Jenkins Bros., New York.
McAlear Mfg. Co., Chicago, Ill.
Marsh & Co., Jas. P., Chicago, Ill.
Marsh Valve Co., Dunkirk, N. Y.
Milwaukee Valve Co., Milwaukee, Wis.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.
Trane Co., La Crosse, Wis.
Scott Valve Mfg. Co., Detroit, Mich.
Simplex Heating Specialty Co., Inc., Lynchburg, Pa.
Sterling Engineering Co., Milwaukee, Wis.
Stickle Steam Specialties Co., Indianapolis, Ind
Webster & Co., Warren, Camden, N. J.

Reducing.

American District Steam Co., No. Tonawanda, N. Y.
Atlas Valve Co., Newark, N. J.
Davis Regulator Co., G. M., Chicago, Ill.
Dunham Co., C. A., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Johnson Service Co., Milwaukee, Wis.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Mason Regulator Co., Boston, Mass.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.

Regulating.

American District Steam Co., No. Tonawanda N. Y.
Atlas Valve Co., Newark, N. J.
Fulton Co., Knoxville, Tenn.
Hornung, J. C., Chicago, Ill.
Illinois Engineering Co., Chicago, Ill.
Jenkins Bros., New York.
Kieley & Mueller, Inc., New York.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, O.
Powers Regulator Co., Chicago, Ill.

Relief (Water).

American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
McAlear Mfg. Co., Chicago, Ill.
Powell Co., Wm., Cincinnati, Ohio.

Safety.

American District Steam Co., No. Tonawanda, N. Y.
American Schaeffer & Budenberg Corp., Brooklyn, N. Y.
Jenkins Bros., New York.
Powell Co., Wm., Cincinnati, O.

Stop and Check.

(See Valves, Non Return).

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Portable Unit.

American Blower Co., Detroit, Mich.
Buckeye Blower Co., Columbus, Ohio.
Mueller Furnace Co., L. J., Milwaukee, Wis.
Nelson Corporation, Herman, Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Stickle Steam Specialties Co., Indianapolis, Ind
Sturtevant Co., B. F., Hyde Park, Mass.
York Heating & Ventilating Co., Philadelphia, Pa

(See also Heaters, Portable Unit Air).

VENTILATING SYSTEMS

Air Conditioning & Engineering Co., St. Louis, Mo.
American Blower Co., Detroit, Mich.
Autovent Fan & Blower Co., Chicago, Ill
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Carrier Engineering Corporation, Newark, N J
Clarage Fan Co., Kalamazoo, Mich.
Ilg Electric Ventilating Co., Chicago, Ill.
Massachusetts Blower Co., Watertown, Mass
Nelson Corporation, Herman, Moline, Ill.
Nesbitt, John J., Inc., Atlantic City, N. J.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Seymour, James M., Newark, N. J.
Skinner Bros. Mfg. Co., St. Louis Mo.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa

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Aeolus Dickinson Co., Chicago, Ill.
Bayley Mfg. Co., Milwaukee, Wis.
Buckeye Blower Co., Columbus, O.
Buffalo Forge Co., Buffalo, N. Y.
Ilg Electric Ventilating Co., Chicago, Ill.
New York Blower Co., Chicago, Ill.
Pecco, Inc., St. Louis, Mo.
Peerless Unit Ventilation Co., Inc., Long Island City, N. Y.
Seymour, James M., Newark, N. J.
Sturtevant Co., B. F., Hyde Park, Mass.
L. J. Wing Mfg. Co., New York.
York Heating & Ventilating Co., Philadelphia, Pa

Mushroom.

Aeolus Dickinson Co., Chicago, Ill.
Knowles Mushroom Ventilator Co., New York
New York Blower Co., Chicago, Ill.
Sturtevant Co., B. F., Hyde Park, Mass.
Ventilating Products Co., Chicago, Ill.

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Athey Company, Chicago, Ill.
Chamberlin Metal Weather Strip Co., Detroit, Mich.
Higgin Manufacturing Co., Newport, Ky.

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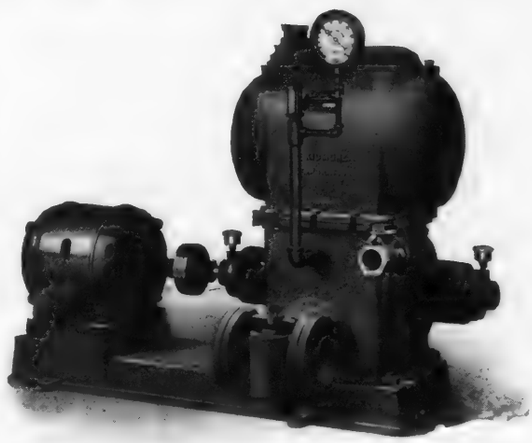

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General Offices and Factory
1535 Dayton St. CHICAGO, U. S. A.

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The world's largest hotels: the Hotel Stevens, Morrison and the Palmer House in Chicago and the Pennsylvania and the Commodore in New York City are all SPENCER cleaned—but whether a hotel is 50 or 3000 rooms, 4 stories or 40, our engineers can solve—forever—your cleaning problems.

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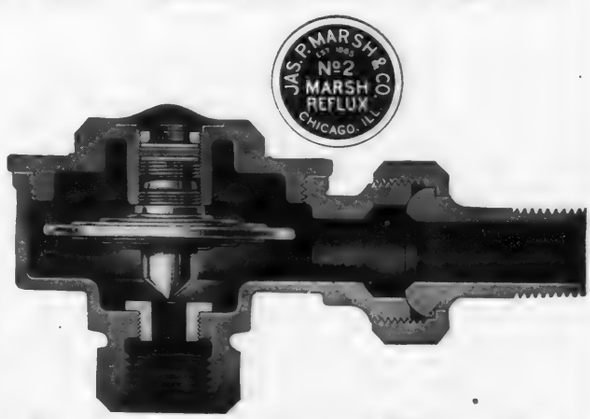

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Automatically discharge air and the water of condensation as fast as it is formed.

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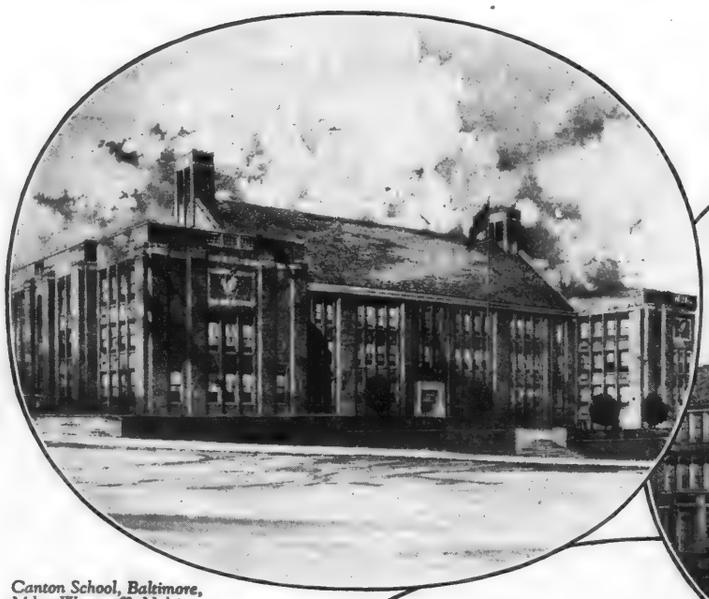

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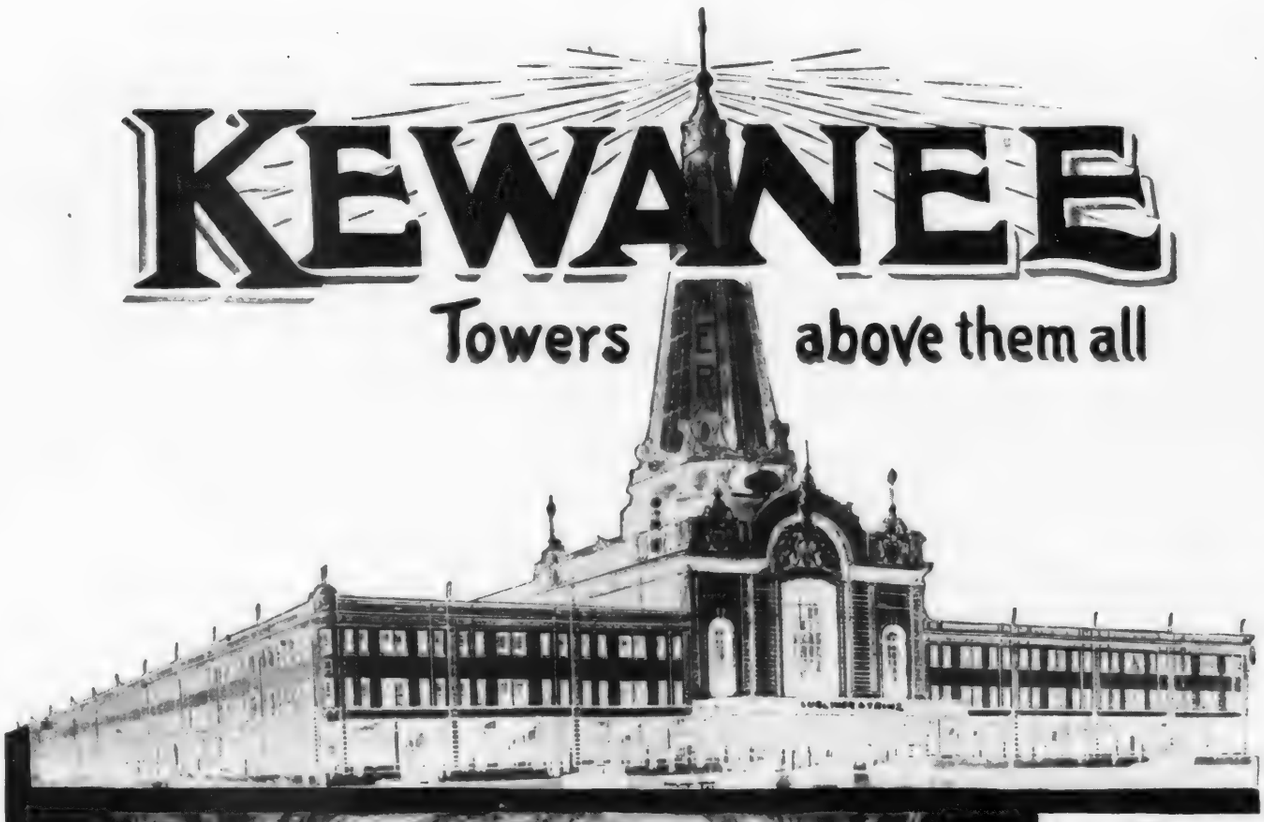

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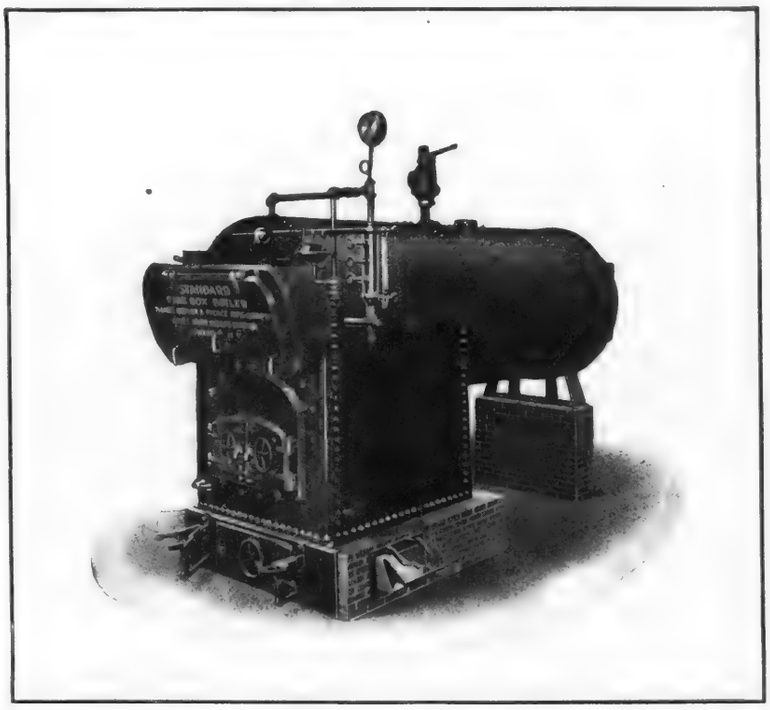

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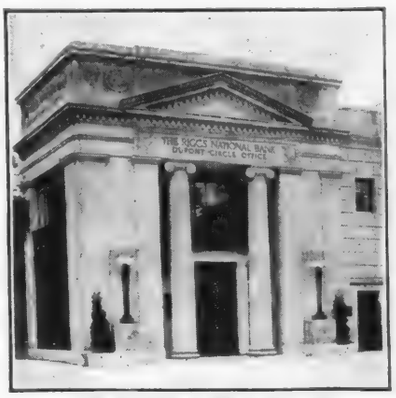

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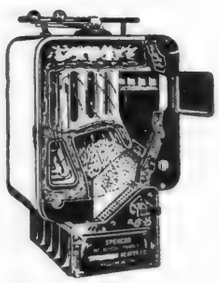
Detroit New York City
Nashua, N. H.

ECONOMY SMOKELESS BOILERS

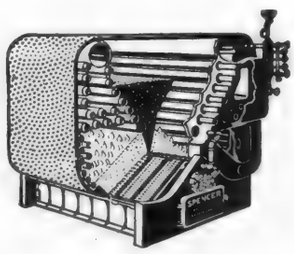
"Please allow us to make a frank statement regarding your Spencer Magazine Feed Heaters. We have installed a number of these boilers, both steam and water type during the past fifteen years, and from the standpoint of all-round efficiency we believe it to be the best boiler on the market today.

"It has a number of features that no other boiler has, which put it in a class by itself."

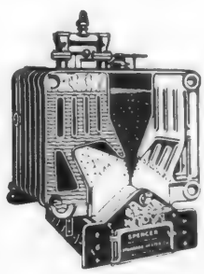
You can sell and install Spencer Magazine Feed Heaters with the assurance that both you and your customer will obtain profit and satisfaction.



SPENCER
Single Grate Heater



SPENCER Steel Tubular Heater
for large installations



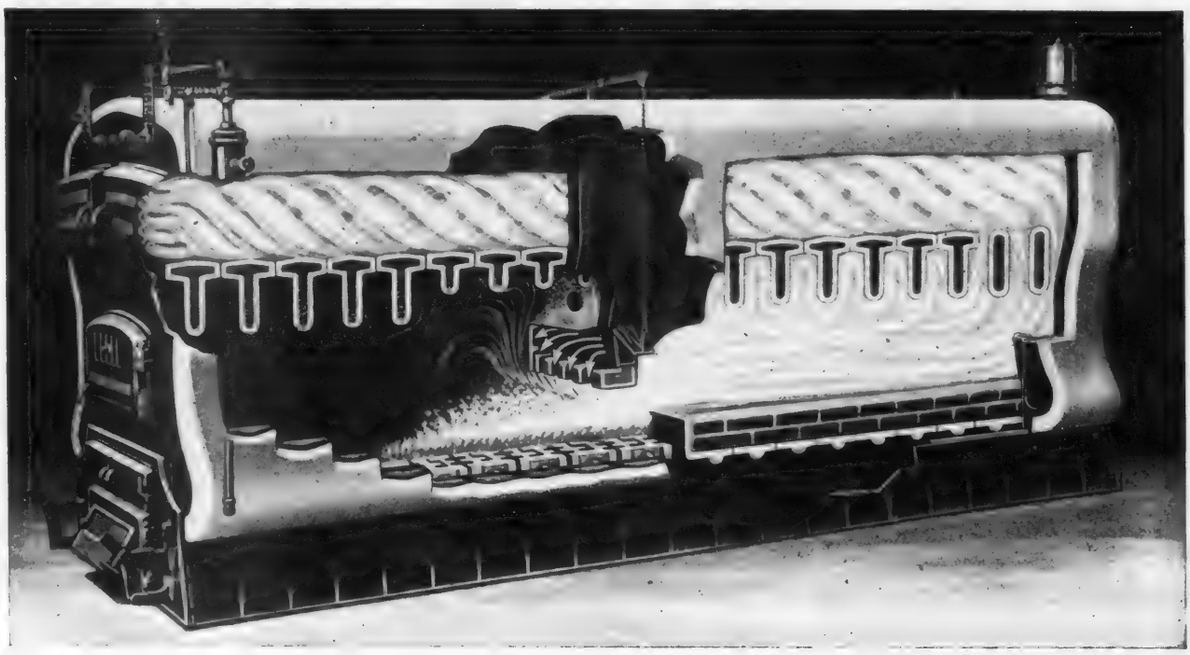
SPENCER
Double Grate Heater

Spencer
steam, vapor or hot water
Heaters
burn No.1 Buckwheat coal

A size and type for every purpose *Sold only through heating contractors*

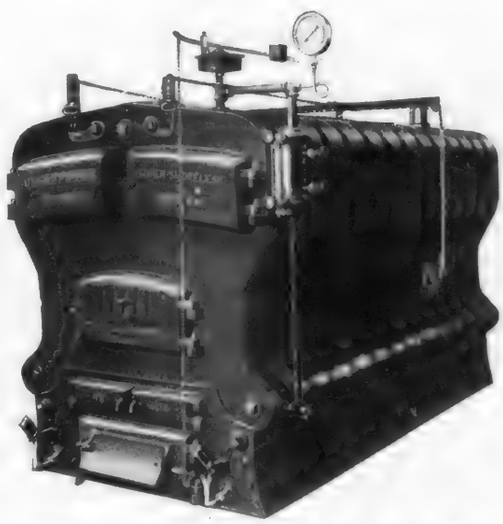
SPENCER HEATER COMPANY *General Offices:* WILLIAMSPORT, PA.

New York City Boston Philadelphia Baltimore Buffalo Rochester Hartford Washington Detroit Schenectady Syracuse Harrisburg Scranton



Cutaway View of Utica-Imperial SUPER-SMOKELESS Boiler

Protection Against The Heat Thief—SMOKE



Exterior View of Boiler Showing Air Inlet

IN BURNING soft coal, about one-third of the heat value of the fuel is ordinarily wasted in the form of smoke. The volatile matter distilled from the fire is allowed to escape up the chimney in costly clouds. This means a loss of heat units of the coal and a waste of the money which pays for it just as surely as if the owner were heating his building with a merry little blaze of dollar bills.

SUPER-SMOKELESS Boilers prevent this waste by burning smoke and soot as valuable fuel. They eliminate the smoke nuisance and cut the coal bill, by utilizing ALL OF THE FUEL to obtain maximum heating efficiency. In addition to burning soft coal smokelessly and with the greatest economy, they have proved remarkably efficient for oil-burning and will utilize successfully hard coal, coke and other fuels—thus protecting the owner against any fuel emergency. For these reasons, SUPER-SMOKELESS Boilers are the best investment your customers can make.

UTICA—IMPERIAL

SUPER-SMOKELESS-BOILERS

Manufactured by the

UTICA HEATER COMPANY, UTICA, N. Y.

"Pioneers in Smokeless Combustion"

Sales Offices in the Principal Cities

THATCHER
BOILERS-FURNACES-RANGES

Enduring products build Sales for you

YOUR customers will give *you* the credit for the thoroughly satisfactory performance of any product you sell them.

Furthermore, they will boast of your reliability to their friends, thus building greater sales for you—just the type of business THATCHER Boilers, so dependable, so durable, have been creating for dealers for 76 years.

Made for both steam and hot water in twelve sizes, this Round Boiler will give enduring service to your clients with less fuel consumption. Installed by you, it will prove a business builder.

Write today for further information on THATCHER Boilers and inquire about our liberal dealer cooperation

THE THATCHER COMPANY
formerly Thatcher Furnace Co.
Since 1850

Newark, N. J.
39-41 St. Francis St.
Chicago
341 N. Clark St.
New York
21 W. 44th St.

The THATCHER Round Boiler

Extremely large water ways, staggered fire travel, and an unusually deep "fire pot".

The dome section is well rounded, with steam space considerably larger than in ordinary boilers.

Your Sales Average Can Excel Babe Ruth's Batting Average

The simplified Combustion Fuel Oil Burner gives the salesman a tremendous advantage for quicker sales. Permits him to work more prospects. This system overcomes the objections so frequently raised against complicated systems burning costly, light oil. The Combustion has only 3 moving parts. Burns genuine fuel oil. No major changes in construction for over 6 years. Adaptable to both domestic and industrial heating. Thousands in use.

Double Franchise for Steady Profits

	DOMESTIC UNITS Sq. Ft. Radiation			INDUSTRIAL UNITS Sq. Ft. Radiation	
	Steam	Hot Water		Steam	Hot Water
No. 0	500	750	No. 4	4000	6400
No. 1	1000	1600	No. 6	8000	12000
No. 3	2400	3800	No. 8	10000	19200

No. 00 for hot water heaters. With automatic controls

Can be installed in any kind of hot air furnace or boiler. All sizes furnished with electric ignition where gas is not available.

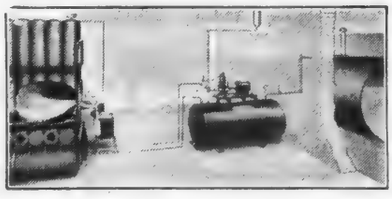
Opens new field for sales to Country Clubs, Road Houses, Creameries, Canning Factories, Hospitals and Sanitariums.

DEALERS—It's the best oil burner proposition today!

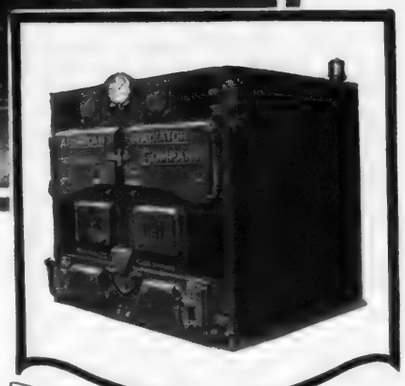
Our dealer in Rockford, Illinois, has sold seven burners in one family. The first one, purchased four years ago, is giving just as good service as the last one.

COMBUSTION FUEL OIL BURNER CO.
13 Keefe Ave. Milwaukee, Wis.
Subsidiary of Milwaukee Air Power Pump Co.

The Combustion Fuel Oil Burner



Oxford Hall, Detroit, Michigan, warmed by an Ideal Water Tube Boiler



IDEAL Boilers

make owners enthusiastic

ENTHUSIASTIC clients are the biggest asset any engineer can have.

Everywhere engineers have found that one sure way to create this enthusiasm is through the perfect performance of Ideal Boilers and American Radiators.

The letter at the right is not unusual. And naturally the engineer gets the credit for having specified a perfect heating plant.

Every Branch of this company is equipped to give special service to engineers. We shall be glad to have you call on us.

OXFORD HALL
The Home of Comfort and Refinement
HENDRIE STREET AT BRUSH
DETROIT

American Radiator Company,
400 Fisher Building,
Detroit, Michigan.

May 21, 1926.

Gentlemen:

I take the pleasure in reporting the results and satisfaction that I have obtained from an American Radiator boiler.

We rent ninety-three, one, six and three room furnished apartments with an Ideal Water Tube boiler and on the coldest days of winter, two to three pounds of steam pressure will keep the thermometer in the neighborhood of 80 degrees.

It is gratifying to know how economically less fuel it takes to run this boiler.

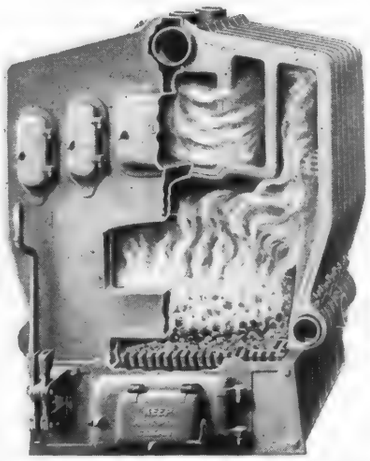
Without hesitancy I recommend an Ideal boiler.

Yours respectfully,
Oxford Hall Apartments
Manager

AMERICAN RADIATOR COMPANY

Showrooms and sales offices: New York, Boston, Providence, New Haven, Newark, Philadelphia, Baltimore, Washington, Richmond, Buffalo, Pittsburgh, Cleveland, Detroit, Cincinnati, Atlanta, Chicago, Milwaukee, Indianapolis, St. Louis, St. Paul, Minneapolis, Omaha, Kansas City, Denver, San Francisco, Los Angeles, Seattle, Toronto, London, Paris, Milan, Brussels, Berlin

Makers of IDEAL BOILERS *and* AMERICAN RADIATORS *and other products for heating, ventilating and refrigeration*



This is the hot water type, 51¾ inches high. For steam it is 57 inches high, giving a generous steam dome, ample in size to prevent priming.

No Need To Rebuild The Cellar To Fit The Boiler

HOW often have you had to dig boiler pits and do all sorts of stunts to get in a boiler that was too high for the cellar ceiling?

Often enough, no doubt, to make the broad, low lines of the Burnham a godsend.

Both for steam and hot water heating the Burnham Square Boiler, designed to do a big job well, is low enough to go in the average cellar comfortably—even where the ceiling is too low for comfort otherwise.

Yet it has all the Burnham economy features of long fire travel, divided grates, effective regulating devices and accessible cleanout doors to make it the watch dog of the fuel pile.

And remember, there's more heat in a pound of coal burned the Burnham way.

Write for booklet that tells all about Burnham Boilers

Burnham Boiler Corporation

Irvington, N. Y.

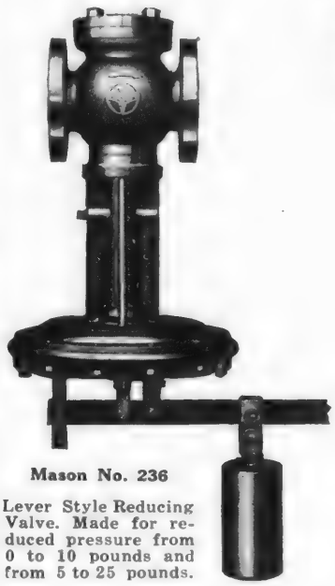
New York Office—30 E. 42nd Street

Representatives in all Principal Cities

Canadian Offices:
Harbor Comm. Bldg., Toronto
124 Stanley St., Montreal

The

MASON



Mason No. 236

Lever Style Reducing Valve. Made for reduced pressure from 0 to 10 pounds and from 5 to 25 pounds.

Reducing Valve for Heating Systems

The Mason Lever Style Reducing Valve is backed by forty-three years of specialization in pressure control engineering.

It is balanced, the weighted lever suspended on hardened steel knife edges, and friction is eliminated so that it operates with a minimum amount of power irrespective of initial pressures.

Accurate, dependable control for the life of the job is mighty important. Make sure of it by specifying Mason Reducing Valves.

Let us send you Catalog 62.

83

Mason Regulators

MASON REGULATOR CO.
Boston, Mass.

ROSS BOILERS
have a smokeless digestion

Boiler dyspeptics are doomed. Like humans, many are fed in unlimited quantities with little effect. Indigestion may be an acquired disease with people, BUT—it is a built-in malady in boilers.

The digestive organs of ROSS Boilers are so built that they absorb the heat units. The water circulation, exposed surfaces and general design admit of the greatest economy of fuel—either low-grade coal or oil.

Ross Boilers are made in 30 sizes. Capacities from 400 to 27,000 ft.

There are ten convincing reasons for ROSS Boiler superiority.

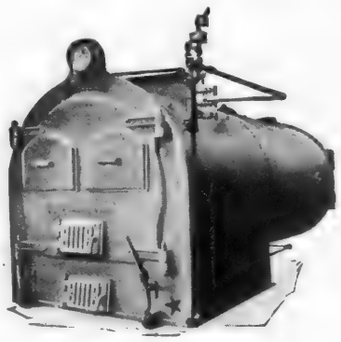
Our Catalog tells why. Write for it.

The Frost Manufacturing Co.

—Since 1851—

Main office and works 1520 HENDERSON ST., GALESBURG, ILL.

STANWOOD
Smokeless BOILERS



29 to 210 H.P.
Pressures of 15 to 150 lbs.

Of 17 big money saving features these 5 are the most startling:

1. **Low water line.**
2. **Rapid water circulation.**
3. **No staybolts.**
4. **No mud legs.**
5. **Front is like a door.**

Send this Coupon for full details of this improved boiler.

Coupon D-7 for Pamphlets describing 17 money saving features of the improved Stanwood Boiler.

Name .....

Co. .....

City .....

These bulletins have been prepared by one of America's foremost mechanical engineers and contain valuable information and advice.

THE STANWOOD CORPORATION
Established 1891
CINCINNATI

EACH RADIATOR AN INDEPENDENT STEAM HEATING PLANT

In the Living Room

Heat as Needed in the Finest Homes

This New York home is one of the many in which Clow Gasteam Radiators are making a flexible heating system.

In the fall and spring, these radiators provide ample heat for the entire house. During these seasons, they supply their own heat. In extreme cold weather, the Clow Gaswater Radiators are thrown into the standard heating system and function as ordinary radiators.

Combination Heating provides heat for offices or homes when and where it is wanted. If the boiler is shut down, it is only necessary to turn the valves, strike a match and light the Clow Radiators.

Clow Gaswater Radiators can be furnished fitted for all standard systems. Also Clow Gasteam Radiators for either vacuum or vapor, one or two pipe steam systems.

JAMES B. CLOW & SONS
201-299 N. Talman Ave., Chicago
Offices in Principal Cities

CLOW
GASTEAM — GASWATER

Titusville Boilers

in the Largest and most Exclusive Apartments in New Jersey!

TITUSVILLE BOILERS were recently installed in the new Duncan Apartments at Jersey City, N. J., under the supervision of John T. Rowland, Architect, and John H. Cooney, Heating Contractor.

The installation consists of three T-86 TICO Heating Boilers and one TS-9 TICO Downdraft Boiler for hot water and equipped with water-tube grates for garbage burning service.

Just another instance of the adaptability and serviceability of Titusville Boilers for apartments and other public buildings.

Titusville Catalog No. 85 will be sent on request.

THE TITUSVILLE IRON WORKS COMPANY

TITUSVILLE, PENNA.

SALES OFFICES:

New York, 152 West 42nd Street — Detroit, Mich., 833 Washington Blvd. Bldg. — Pittsburg, Pa., Farmers Bank Bldg. — Washington, D. C., Woodward Building — Buffalo, N. Y., Marine Trust Bldg. — Chicago, Ill., No. 1134 Harris Trust Bldg.

Coal SAVED by FITZGIBBONS Steel Boilers Soon Pays for them

One more safeguard than customary was added to the selection of equipment for the modern 23-story Pennsylvania Building here illustrated, for the owners, Julius Tishman & Sons, are experienced *builders*. Their long experience, coupled with that of the veteran New York architects, Schwartz & Gross, and the heating contractors, Raisler Heating Co., resulted in selecting three Fitzgibbons Boilers of 28,000 sq. ft. each.

For forty years Fitzgibbons STEEL Boilers have been the choice of men you *know*, because they

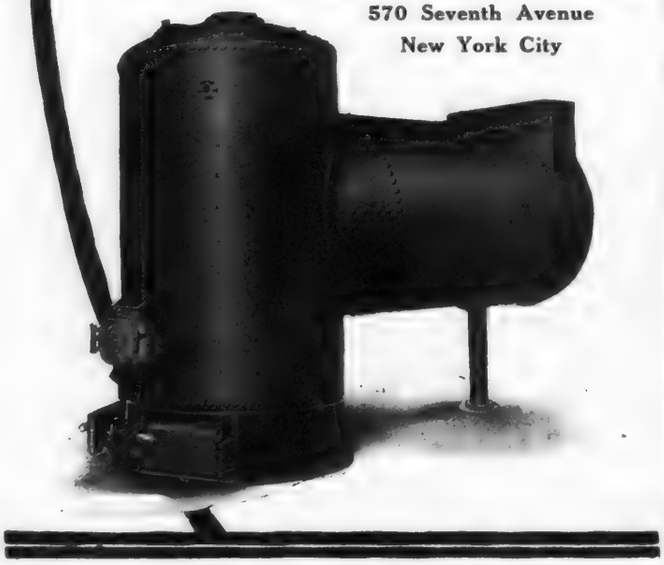
—effect big fuel savings
—are easy to fire and clean
—cost practically nothing for upkeep
—require 1/5 less space.

Fitzgibbons Boilers can be used for steam or hot water, with any kind of fuel, coal or oil. Made in sizes to heat the largest skyscraper or the smallest residence.

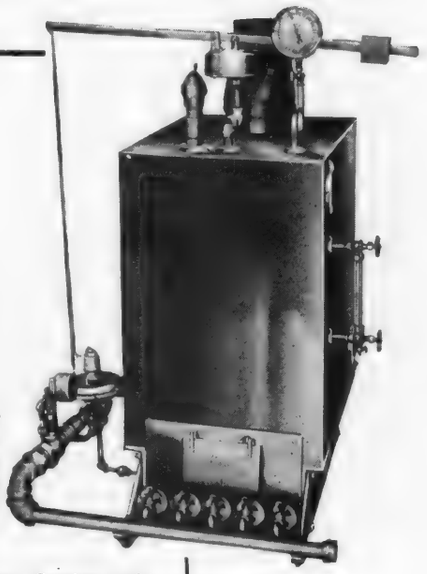
Write for our interesting booklet.

FITZGIBBONS BOILER CO., INC.

570 Seventh Avenue
New York City



Universal Cast Iron Sectional Gas Boilers



For Natural or Manufactured Gas

If METALLIC JACKET is not wanted, deduct from the net, $13.50 for a 3 Section Boiler and $1.25 net for each additional section over three.

With Special Circulating Section and Metallic Jacket lined with Super-Firefelt

Boiler Number	Steam Rating	Number Sections	List Price	Approximate Shipping Weight
31 TS	380	3	$208.00	735
41 TS	480	4	255.00	1137
51 TS	660	5	312.00	1300
61 TS	840	6	367.00	1475
32 TS	1020	7	421.00	1629
42 TS	1200	8	460.00	1789
52 TS	1380	9	512.00	1954
62 TS	1560	10	564.00	2116
72 TS	1740	11	615.00	2281
33 TS	1920	12	665.00	2445
43 TS	2100	13	714.00	2606
53 TS	2280	14	762.00	2767
63 TS	2460	15	809.00	2928
73 TS	2640	16	863.00	3094
34 TS	2820	17	909.00	3227
44 TS	3000	18	962.00	3319
54 TS	3180	19	1006.00	3582
64 TS	3360	20	1059.00	3741
74 TS	3540	21	1102.00	3938
35 TS	3720	22	1154.00	4095
45 TS	3900	23	1196.00	4257
55 TS	4080	24	1248.00	4431
65 TS	4260	25	1288.00	4604
75 TS	4440	26	1339.00	4769
36 TS	4620	27	1379.00	4932
46 TS	4800	28	1429.00	5100
56 TS	4980	29	1467.00	5263
66 TS	5160	30	1518.00	5433
76 TS	5340	31	1554.00	5668

Steam Boilers—Height to water-line 29 in. Height to top flue opening 38 in.

Patented Universal Gas Boiler with Metallic Jacket. The front panel is easily removable for cleaning.

STEAM OR VAPOR BOILERS

Outlets, 2-3".

Fifteen - section boilers and over have one extra 1½" outlet for every 10 sections.

Returns, 2-3".

Trimmings—Safety valve, steam gauge, water glass complete with try-cock, automatic gas control valve, automatic steam pressure regulator, metal bellows type; pilot, complete with lava tip and cut-off valve.

WATER BOILERS

Outlets, 2-3".

Returns, 2-3".

Trimmings—Thermometer, altitude gauge, automatic gas control valve, pilot.

With Plain Section and Metallic Jacket lined with Super-Firefelt

Number	Steam Rating	Water Rating	Number Sections	List Price Water	List Price Steam	Approx. Shipping Weight
31 PS and PW	300	480	3	$146.00	$188.00	715
41 PS and PW	400	665	4	194.00	227.00	1017
51 PS and PW	550	905	5	241.00	275.00	1150
61 PS and PW	700	1145	6	288.00	322.00	1293
32 PS and PW	850	1385	7	332.00	369.00	1419
42 PS and PW	1000	1625	8	363.00	399.00	1549
52 PS and PW	1150	1865	9	406.00	445.00	1684
62 PS and PW	1300	2105	10	450.00	488.00	1816
72 PS and PW	1450	2345	11	492.00	533.00	1951
33 PS and PW	1600	2585	12	534.00	575.00	2085
43 PS and PW	1750	2825	13	575.00	617.00	2216
53 PS and PW	1900	3065	14	616.00	658.00	2347
63 PS and PW	2050	3305	15	654.00	698.00	2478
73 PS and PW	2200	3545	16	700.00	744.00	2614
34 PS and PW	2350	3785	17	737.00	784.00	2717
44 PS and PW	2500	4025	18	782.00	828.00	2879
54 PS and PW	2650	4265	19	819.00	867.00	3012
64 PS and PW	2800	4505	20	863.00	911.00	3141
74 PS and PW	2950	4745	21	899.00	949.00	3278
35 PS and PW	3100	4985	22	943.00	993.00	3405
45 PS and PW	3250	5225	23	977.00	1029.00	3537
55 PS and PW	3400	5465	24	1021.00	1073.00	3681
65 PS and PW	3550	5705	25	1054.00	1108.00	3824
75 PS and PW	3700	5945	26	1098.00	1151.00	3959
36 PS and PW	3950	6185	27	1130.00	1185.00	4092
46 PS and PW	4100	6425	28	1173.00	1228.00	4231
56 PS and PW	4250	6665	29	1204.00	1261.00	4363
66 PS and PW	4400	9605	30	1246.00	1304.00	4503
76 PS andPW	4550	7145	31	1276.00	1335.00	4708

Steam Boilers—Height to top flue opening 38 in. Height to water-line 26 in.
Water Boilers—Height to top flue opening 38 in.

Universal Smokeless Boiler Co.
Ravenna, Ohio

Great News!

The Master Furnace Man

A smashing new Advertising Campaign

THE SATURDAY EVENING POST
JUNE 26, 1926
The Literary Digest
June 12, 1926
The Heating & Ventilating Magazine
A Monthly Journal of Engineering Progress
Stop That Heat and Steam Waste
FUEL OIL

DOUBLE spreads in color—full pages—startling illustrations—strong selling copy—the two greatest National magazines! That is the new Electrol advertising campaign, introducing The Master Furnace Man.

With blood of oil, muscles of steel, nerves of wire—he represents Electrol, its mechanical perfection, its dependability, its reliable dealer service.

Every oil burner prospect will learn to know Electrol as The Master Furnace Man. Wherever they turn—to the magazines, newspapers, bulletin boards, mail, windows, display rooms—The Master Furnace Man will impress them with the almost human quality of Electrol.

And for every Electrol Dealer he becomes also a Master Salesman. Working all the time to sell more Electrol Oil Burners for them!

Every Electrol National ad an Electrol Dealer ad

EVERY Electrol Dealer is supplied with sales and advertising material of the stongest kind. Each one carries The Master Furnace Man. Immediately each dealer advertisement is recognized as an Electrol advertisement. Each dealer's own prospects, in reading the great National magazines, recognize in the Electrol pages strong selling advertisements for that dealer.

The Electrol Dealer gets the full benefit of Electrol National Advertising, through the use of THE MASTER FURNACE MAN.

Shown on this page—Master Furnace Man Cut-out, Envelope Inserts, Decalcomania and standard design for Bulletin Boards.

(Scott-Newcomb System)
ELECTROL
Quiet, All-Electric Oil Burner
Not just an Oil Burner ~
but The Master Furnace Man
ELECTROL SALES CO. of ATLANTA
175 PEACHTREE ST. PHONE BROAD 9000

(Scott-Newcomb System)

ELECTROL

Quiet, All-Electric Oil Burner

The Master Furnace Man Knocks at Your Door

Electrol Dealers have been among the first to recognize Electrol as The Master Furnace Man. So well has it been engineered and constructed, and so rigid are the factory tests, that every Electrol that goes out is ready for instant installation, without trouble. Electrol Dealers are not spending all of their profits on service calls!

Success is the rule with Electrol Dealers. They have had the right product from the very beginning. For Electrol Incorporated did not go after distribution until its product was fully developed. They have had strong factory co-operation and liberal sales policies.

There are Electrol Dealers in most sections of the country and most of them have been with us for years. But there are a few territories open. Yours may be one! Write for information.

Be the one to bring The Master Furnace Man to your locality.

MONARCH SMOKELESS BOILERS

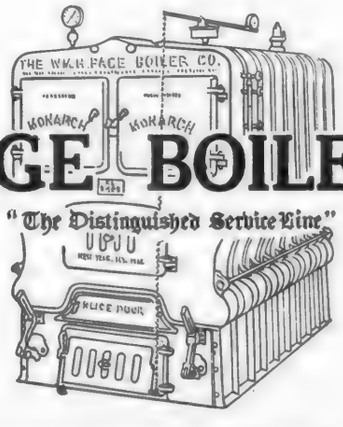
burn soft coal, hard coal or coke, *without smoke. Smoke is wasted fuel.*

The longer fire travel, three times back and forth, the entire length and breadth of the boiler, each time on a different level, is a guarantee to the owner, engineer and contractor that the heat produced by the burning fuel, even at a high rate of combustion, will be fully utilized in the generation of steam. *Efficient with usual fuels—efficient with substitutes.*

Monarch Boilers, with and without air inductor, are widely specified for use with oil burners and forced draft blower grates, for burning smaller sizes of hard coal. The longer fire travel in Monarch Boilers, desirable under any conditions, is a necessity in such cases if full efficiency is to be realized.

Capacities 850 to 29,000 sq. feet steam.

Send for catalogue No. 52.



PAGE BOILERS

THE WM. H. PAGE BOILER CO.

200 Madison Avenue

NEW YORK

BOSTON
PHILADELPHIA

CLEVELAND
MEADVILLE

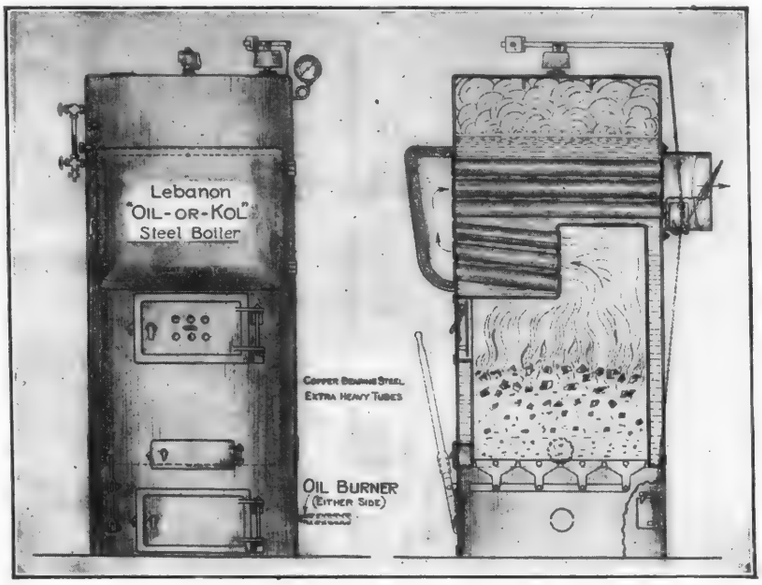
Established 1856

Incorporated 1876

For Homes and Small Buildings

Lebanon "Oil-or-Kol" Steel Boilers

Steam, Water or Vapor Heating—Domestic Hot-Water Supply



Boiler No.	"NET" Steam RATING		Boiler Dimensions
	**Hard Coal Sq. Ft.	Oil Fuel Sq. Ft.	Diam. x Hgt. Inches
*OK-118	300	375	18x57
*OK-121	400	500	21x57
*OK-124	550	700	24x60
*OK-127	750	925	27x63
*OK-130	1000	1250	30x63
OK-133	1300	1625	33x66
OK-136	1650	2050	36x66
OK-139	2050	2550	39x72
OK-142	2500	3125	42x72

*Small-doorway sizes

**For Soft Coal the next larger size boiler is recommended

PLEASE ASK FOR BULLETIN 26-B

LEBANON BOILER WORKS

PHILADELPHIA OFFICE
507 Harrison Bldg.
(15th & Market Sts.)

J. K. PETTY & CO., Inc., Proprietors
Main Office and Works, 1244 Buttonwood Street
LEBANON, PA.

Koithan & Pryor, Representatives
39 Cortlandt St., NEW YORK CITY
Representatives in Principal Cities

Thermoflex Alternator Trap

Our new detail sheets for architects and engineers are now ready and will be sent upon request.

A vital part of the Thermoflex Vapor Heating System. Insures return of condensation to boiler under varying pressure conditions. Simple in design and sturdily constructed.

A few of the rapidly growing list of Thermoflex installations:

MYLES STANDISH APARTMENTS, Boston, Mass.
PELHAM HALL, Boston, Mass.
BURROUGHS PUBLIC LIBRARY, Bridgeport, Conn.
UNION TRUST CO., Providence, R. I.
GABLES APARTMENTS, Cincinnati, Ohio.
HIGH ST. PROPERTIES, Buffalo, N. Y.
ST. JOHN'S PREPARATORY SCHOOL, Danvers, Mass.
BOSTON & MAINE OFFICE BLDG., Boston, Mass.
SACRED HEART CHURCH & SCHOOL, Lawrence, Mass.
BRIDGEWATER NORMAL SCHOOL, Bridgewater, Mass.
BALTIMORE FIRE DEPT. SHOPS, Baltimore, Md.

W. D. CASHIN COMPANY

35 Hartford St., Boston, Mass.

Representatives in Principal Cities

COIL

STEEL HEATING BOILERS AND WATER HEATERS

For Coal or Oil Fuel

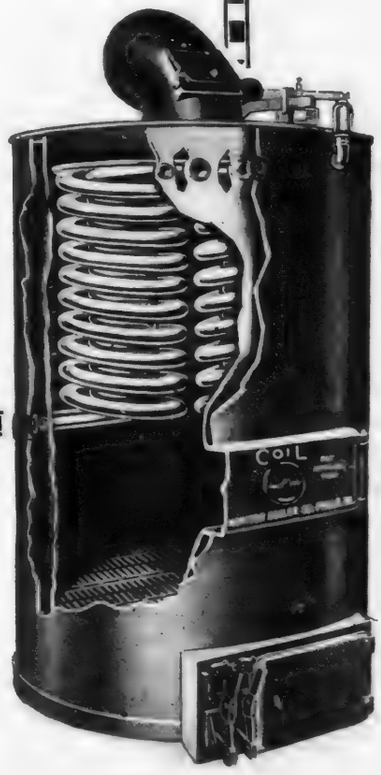
Used in connection with oil burners, COIL Boilers have replaced many boilers of other types, and they have shown increased heating economy as high as 25% or more with the same burner.

The amount of heating surface per unit of rating is exceptionally high, and it is tremendously effective, especially when used with an oil burner, because so much of the total heating surface is "within view" of the flame, and hence capable of absorbing the radiant heat.

The Steel Construction of the COIL Boiler prevents it from cracking, even when subject to extreme temperature changes. The following quotation refers to a COIL Boiler used to heat a factory:

"We allow the boiler to become cold overnight and bring it up as quickly as possible in the morning with an oil burner. It generates steam very quickly and we are free from leaks at joints which was the case in a boiler used before. Apparently your boiler takes care of this very rapid expansion and contraction of sudden and intense heat."

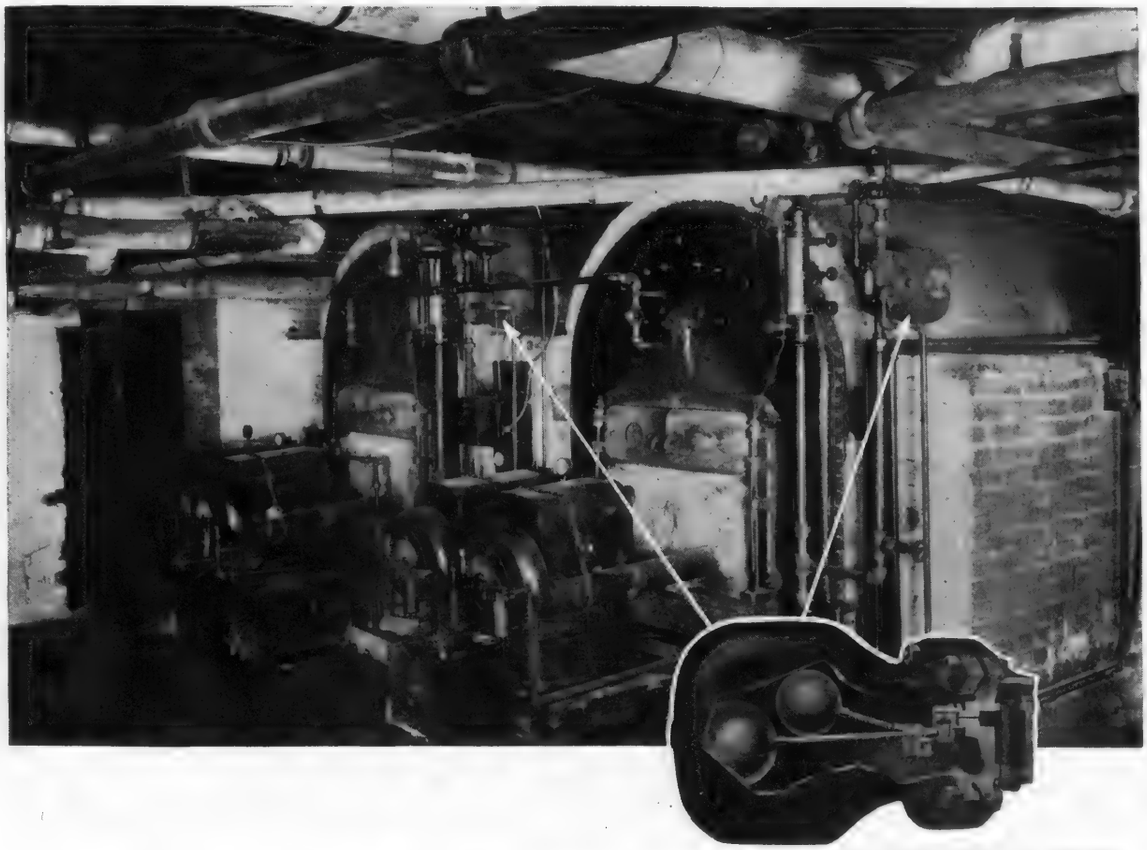
Full details regarding COIL Boilers and names of COIL installations gladly furnished on request.



MONITOR BOILER COMPANY

1505 Race Street

PHILADELPHIA, PA.



McDonnell & Miller Duplex Boiler Feeders installed in the Oak Park Masonic Temple, Oak Park, Ill.

IT NEVER FORGETS!

Forgetfulness of the water line on oil fired boilers is almost excusable, because it is so easy to forget the water line when you don't have to stoke the fire.

But the McDonnell & Miller Duplex Boiler Feeder never forgets. It is the watch-dog of your boiler water line—it never allows it to get too low or too high—it always maintains just the right level for greatest boiler economy. It prevents burned boilers and cracked sections—it eliminates "water line" worry, and completes the convenience argument of oil burners.

And on pump jobs the McDonnell & Miller Duplex Boiler Feeder is coming to be standard specification by the leading engineers, for they recognize it as a real protection against boiler damage in case the pump fails to function—due to failure of current or any unforseen reason.

It furnishes plenty of water in any emergency, and can be depended upon, under all conditions, without any thought on the part of the operator.

Write for our Bulletin No. H-6.

McDONNELL & MILLER

"Doing One Thing Well"

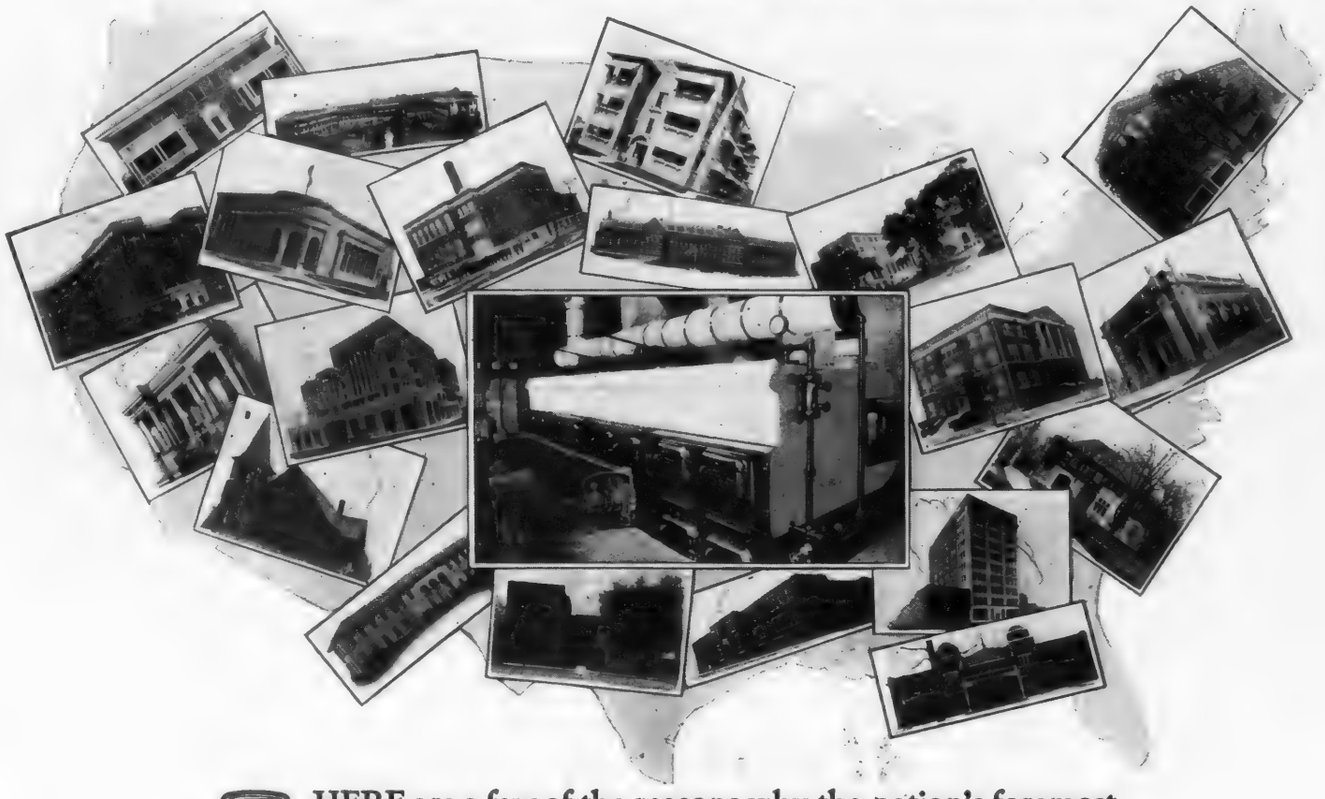
General Offices
WRIGLEY BLDG.
CHICAGO

M&M WATER FEEDER

Eastern Warehouse Stock
BUSH TERMINAL
NEW YORK

Continental

~ in fact and in name



HERE are a few of the reasons why the nation's foremost architects, heating engineers, and contractors, are unconditionally endorsing Continental Boilers and Radiators.

They are profitable to handle and easy to sell.

They perform reliably with any fuel—coal, gas, coke or oil.

They are adapted for all conditions. There's a type of Continental Boiler and Radiator for every place, from the bungalow—with or without a basement—to the apartment house and skyscraper.

Continental Boilers and Radiators are made in a great, modernly equipped foundry, and individually inspected under pressure to eliminate installation trouble and expense.

They are backed by a broad and fair company policy.

The "Continental in fact" recommends the product. The "Continental in name" assures you that you'll enjoy doing business with the firm.

Continental Heater Corporation

Home Office and Factory

Dunkirk, N. Y., U.S.A.

On Lake Erie

Here's A Hot One

The flue construction of National Sectional Boilers causes a three way fire travel. As the flame rises, it passes by an arch of hollow ribs filled with water. The flame then passes to the back of the furnace, through flues surrounded with water to the front, and then through similar flues to the back again.

Every bit of heat in the gases that can be utilized is taken up. This method of construction explains the high efficiency and low coal demands of this boiler. The flues are large and readily accessible for cleaning.

These boilers can be enlarged by using additional sections. They can also be connected in tandem.

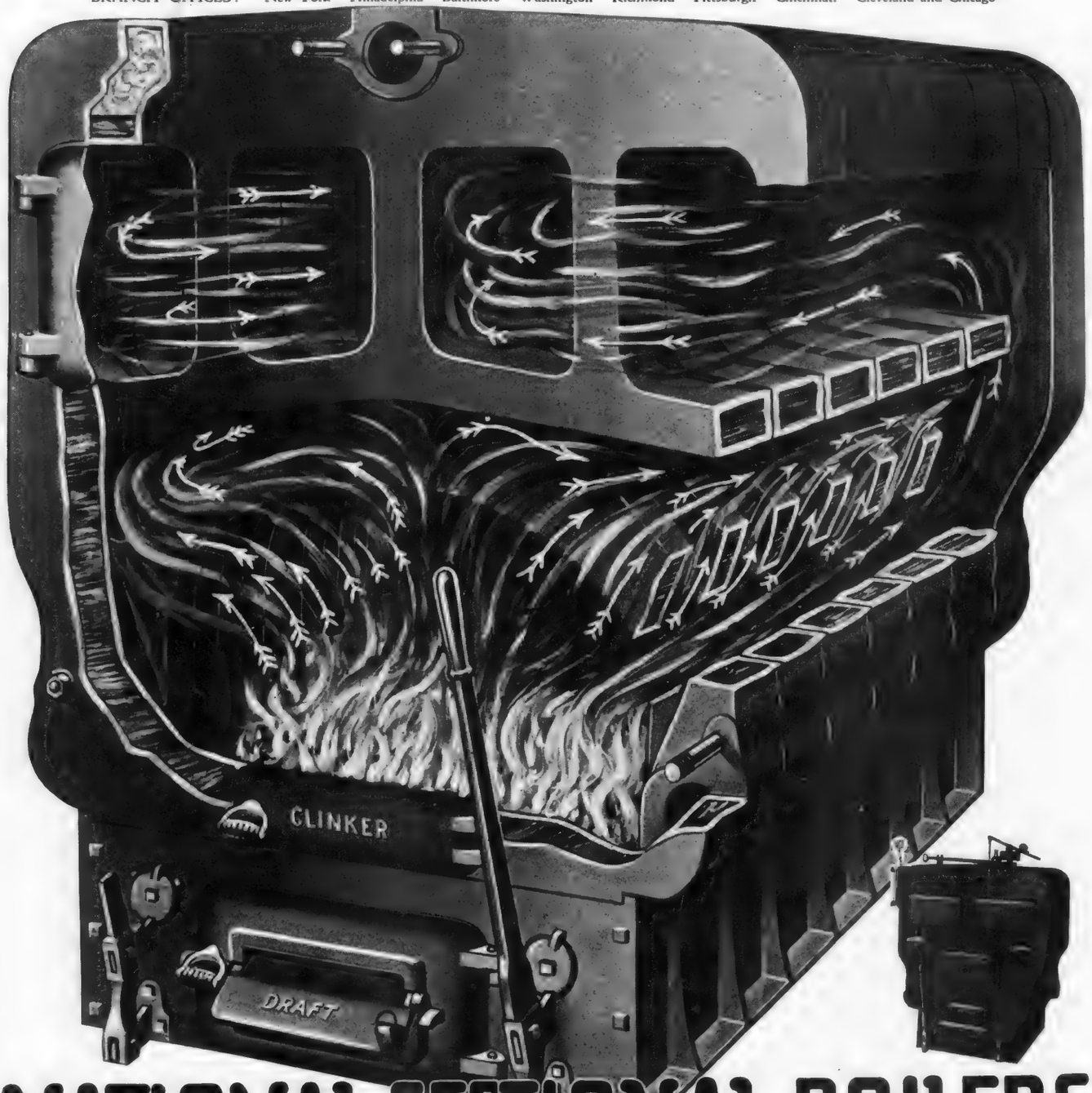
Literature and discount sheets on request.

NATIONAL RADIATOR COMPANY

JOHNSTOWN, PA.

PLANTS: Johnstown, Pa. New Castle, Pa. Trenton, N. J.

BRANCH OFFICES: New York Philadelphia Baltimore Washington Richmond Pittsburgh Cincinnati Cleveland and Chicago



NATIONAL SECTIONAL BOILERS

ANNOUNCING THE
PULVERZONE

Embodying the BEST elements of

1—PULVERIZED COAL BURNING

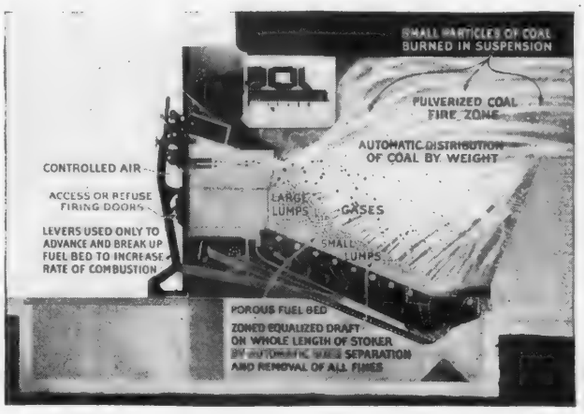
Instantaneous ignition of the fine particles in suspension without danger of explosion

2—SPREAD METHOD

(Light and Continuous) by automatically separating, grading and distributing of coal sizes by weight

3—COKING METHOD

The Standard CoKal Stoker fuel bed provides the intense heat necessary for burning the fines and the spread coal


SMALL PARTICLES OF COAL BURNED IN SUSPENSION
PULVERIZED COAL FIRE ZONE
AUTOMATIC DISTRIBUTION OF COAL BY WEIGHT
CONTROLLED AIR
ACCESS OR REFUSE FIRING DOORS
LARGE LUMPS
GASES
SMALL LUMPS
LEVERS USED ONLY TO ADVANCE AND BREAK UP FUEL BED TO INCREASE RATE OF COMBUSTION
POROUS FUEL BED
ZONED EQUALIZED DRAFT ON WHOLE LENGTH OF STOKER
SEPARATION AND REMOVAL OF ALL FINES

3 coal burning METHODS IN 1

The PULVERZONE brings to the average power plant the opportunity to make large fuel savings hitherto impossible because the right equipment was not available. It provides efficient coal burning apparatus for those thousands of plants where neither pulverized coal or mechanical stokers are justified on account of high first cost. Absolutely smokeless, it meets the strictest smoke ordinances.

Wherever installed, in boilers from 50 to 2000 hp. apiece, these outstanding advantages follow:

Absolutely Smokeless
Abnormally High Efficiencies
Instantaneous Response to Load Changes
Huge Overloads
Perfect Combustion
No Pulverizing Necessary
Uses Standard Screenings (wet or dry)
No Explosion Hazard
No Slagging
Eliminates all Cleaning Periods
Fires Can Be Banked

All return tubular and water-tube boilers from 50 up to 2000 hp. bhp. can be easily equipped with the PULVERZONE at low first cost.

May we explain?

CoKal Stoker Corporation

1014 Wrigley Building, Chicago

Kansas City **New York City** **Philadelphia** **Pittsburgh** **St. Louis**

MELLON NATIONAL BANK :: PITTSBURGH

ARCHITECTS: TROWBRIDGE AND LIVINGSTON, E. P. MELLON, NEW YORK CITY

GENERAL CONTRACTOR: Mellon-Stuart Company, Pittsburgh, Pa. PLUMBING CONTRACTOR: Geo. H. Soffel Company, Pittsburgh, Pa. HEATING CONTRACTOR: Baker, Smith and Company, Inc., New York City

THE institution housed in this magnificent building is the very essence of stability, representing, as it does, probably the most important financial link in the world's greatest industrial center.

It was but natural that the architects who designed the Mellon National Bank Building should reflect in every line and structural item the character of the institution—strength and dependability. "NATIONAL" Pipe was their selection for the heating and plumbing lines.

The Mellon National Bank Building is one of the many prominent buildings in which "NATIONAL" has been selected for the major pipe lines because of its uniformly dependable qualities; a large number of these buildings are illustrated in Bulletin No. 25 which contains useful data on pipe for Heating Engineers and for building purposes generally. A copy will be sent upon request.

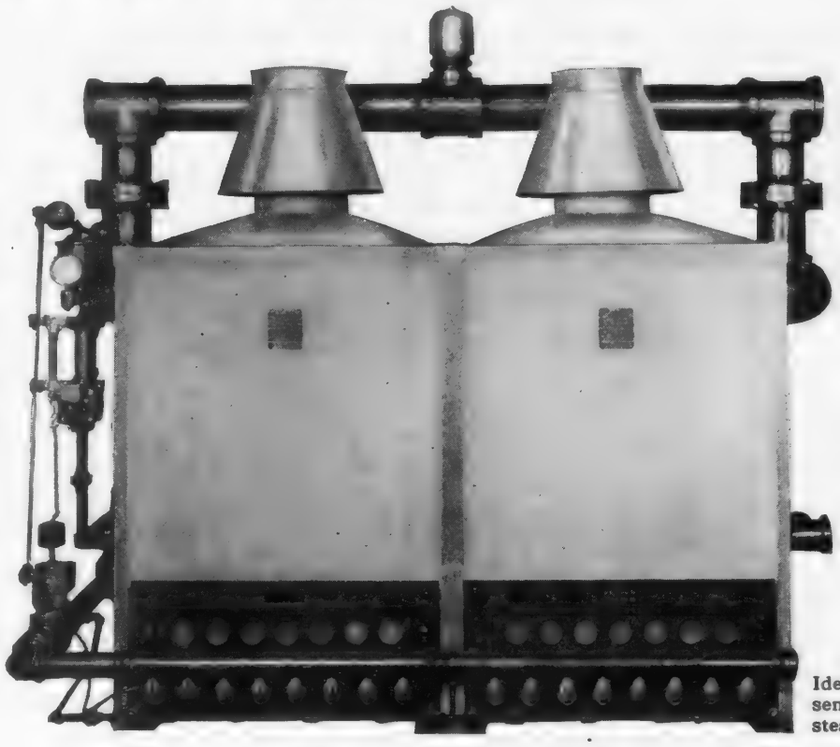
NATIONAL TUBE COMPANY

Frick Building, Pittsburgh, Pa.

"NATIONAL"

THE RECOGNIZED STANDARD OF WROUGHT PIPE

A *new* IDEAL GAS BOILER



Ideal Type 4-G Assembly of 18 Section steam boiler.

—for Large Buildings

The most compact boiler, for its rated capacity, on the market—irrespective of fuel used. That is the latest contribution of the American Radiator Company to gas heating.

The new Ideal Type 4-G Gas Boiler, with its extraordinarily wide range of capacity, will now heat the largest buildings, practically, economically.

A special feature is the low water line of 43″. In addition, the largest assembly of this new boiler has only two flue connections, two outlets, and two returns, all of ample size to handle adequately the rated output.

Here is a boiler designed fundamentally for big installations, equipped with a minimum number of burners of large capacity, furnished complete with thermostatic pilot control, low water gas cut-out, handsome, durable, heavily insulated jacket and other standard equipment common to all Ideal Gas Boilers.

Your local gas company is our distributor for Ideal Gas Boilers. They will tell you about this profitable field for business or, if you wish —write to us for full information.

4-G Gas Boilers are available in capacities from 4,800 sq. ft. to 8,000 sq. ft. steam. Water Boilers from 7,800 sq. ft. to 13,000 sq. ft. Available B T U from 1,152,000 to 1,920,000. Steam Boiler Horsepower ratings from 34.8 to 58.0. Tested and rated according to standard code of the American Gas Association.

IDEAL GAS BOILERS

Product of AMERICAN RADIATOR COMPANY

AMERICAN GAS PRODUCTS CORPORATION

376 Lafayette Street DISTRIBUTORS New York City

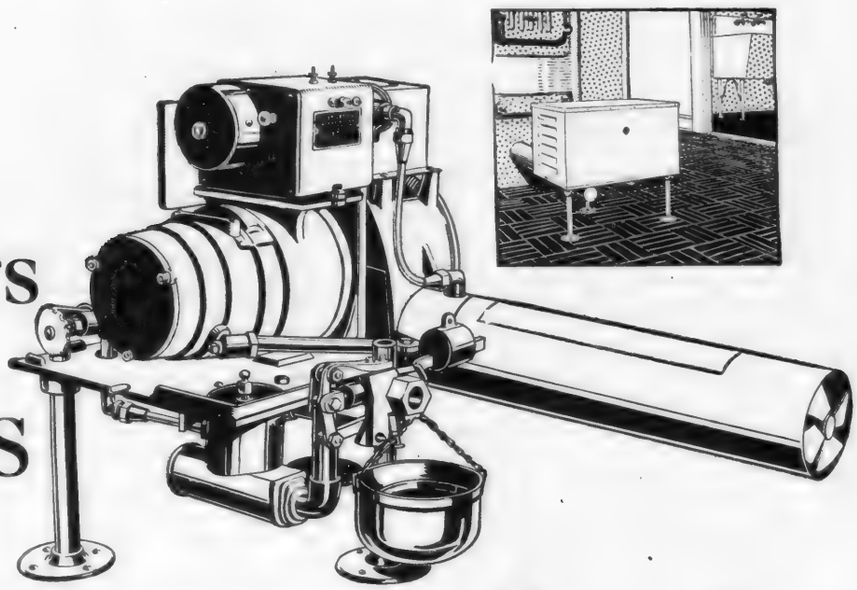
SALES OFFICES: BOSTON, BUFFALO, PHILADELPHIA, JACKSONVILLE, CHICAGO, ST. LOUIS, KANSAS CITY, SAN FRANCISCO

5 Outstanding Features

IN the new Webster Ignition Transformer, oil burner engineers will find an ignition unit which embodies five outstanding features developed by the Webster engineers specially for oil burner use • • This transformer produces a spark of unusual size and length at normal voltage with an exceptionally low power input • • It produces an unusual spark over a wide range of voltage—even with an abnormal line drop • • It is fitted with porcelain terminals for the high tension leads • • It has a self-contained junction box with knock-outs to permit bringing in primary leads in three positions • • Under operation, heating of transformer is well within standard limits • • Webster sales and engineering departments will gladly cooperate with oil burner manufacturers in adapting Webster Ignition Transformer to their burner.

WEBSTER ELECTRIC COMPANY, *Racine, Wisconsin*
"Specialists in Oil Burner Ignition"

Webster Ignition Transformer



Owners *of* NU-WAYS *make* Few Requests *for* Service

(NU-WAY *is* SIMPLE)

Nu-way is the simplest burner of its type —fewer joints, no diaphragms, fewer moving parts. This simplicity is just as important to the man who sells and services the burner as it is to the home owner.

Every service call eats into the profit made in the original sale. So sell the simplest burner—the simplest that burns oil according to the four fundamental laws governing the perfect combustion of oil.

Many Sales Features

Simplicity means also a lack of noise and of vibration, less wear and longer life. Other features are a timed ignition system that insures the instant ignition of the oil —no back-fire; two automatic protective devices that shut off the oil if anything interferes with either fire or burner; special parts made by leaders in their fields; and four sizes that broaden the field of sales possibilities.

Write for Plan

A request, on your own letterhead, will bring you our selling plan; our booklet, "Home Heating A Pleasure"; prices; and details of our ideal financing plan. Territory is being assigned rapidly to reliable agencies—so act at once.

THE NU-WAY CORPORATION
ROCK ISLAND, ILLINOIS

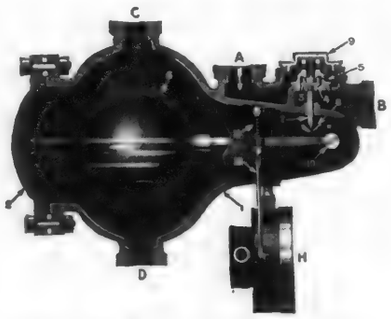
Nu-way

An **AUTOMATIC OIL BURNER**

Approved as Standard by Underwriters' Laboratories

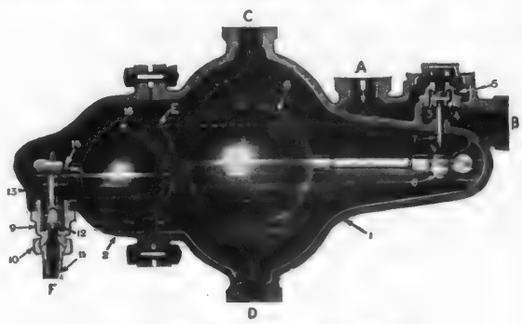
McALEAR

The Only Water Feeder With Low Water Cutout For Oil Burning Installations



No. 836 Simplex Water Feeder with Low Water Cut-out

Write for Bulletin "H"

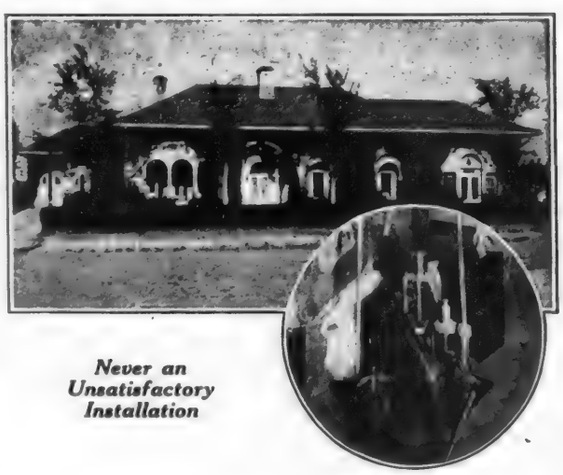


No. 826 Duplex Water Feeder

CHICAGO THE McALEAR MFG. CO. ILLINOIS

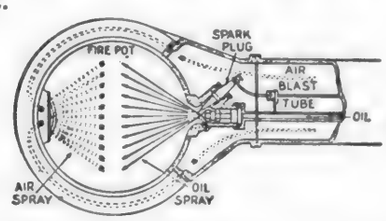
Proved Performance

BAKER Automatic Oil BURNER



Never an Unsatisfactory Installation

FOR seven years throughout America has established Baker Reputation beyond comparison. The method of introduction and burning of air with oil is a Baker Patent. Preheated air with complete atomization makes for economical operation. Tests completed by engineers show 99% practical combustion efficiency. No other heater of its stability or merit.



The Burner De Luxe

The Baker is listed as standard by the Underwriters Laboratories and all state boards. Hundreds of dealers that have sold other makes of burners are now selling Baker Burners. Its marked superiority of performance and absolute dependability are reasons for its popularity. We will be glad to refer any of our dealers to you upon request.

Limited territory still open to aggressive dealers. Write for our free catalogues.

Automatic Home Heating Co.
PUEBLO, COLORADO

ENGINEERED TO A STANDARD BUILT COMPLETE AT THE FACTORY

Kleen-Heet

Comforting *Certainty* of Performance!

This—through more than six years—has been the satisfying experience of Kleen-Heet owners:

When they turned over to Kleen-Heet the heating of their homes, they promptly—and permanently—shed all their heating worries! All that remained was to set the thermostat—and to remember occasionally to order oil.

What matter freeze or thaw! Indoors, where Kleen-Heet was, there was unvarying comfort. And more! —the ease of mind that comes with the perfect assurance that one's comfort will not fail.

With such a record, it is but natural that Kleen-Heet's engineering superiority among oil burners should be everywhere accepted.

And that Kleen-Heet should be so dominantly the choice of the well informed.

Some desirable territory is still available for dealers. Write or wire for profit-making proposition!

WINSLOW BOILER AND ENGINEERING CO.
208 South La Salle Street, Chicago

KLEEN-HEET *With* Oil

TESTED AND LISTED AS STANDARD BY THE UNDERWRITERS' LABORATORIES

3 *plain facts about:*

THE NEW *Silent*

NO COAL
Nokol
AUTOMATIC OIL HEATING FOR HOMES

automatic OIL HEAT

MORE than 31,000 homes have Nokol automatic oil heat today—and have had it for periods up to nine years. We believe their heating costs have been the lowest known for any automatic oil heat; seldom more than hard-coal; usually less.

The new Silent Nokol is merely a refinement (by remarkably simple flame-softening) on this past high efficiency—*by which efficiency is even somewhat increased.*

It cuts all noise to the vanishing point!

Architects, builders, heating contractors are going to have discussions of this matter with clients. We offer a file of detailed facts upon request. Address:

AMERICAN NOKOL COMPANY
215 N. Michigan Blvd., Chicago, Ill.

Manufacturers and guarantors of Nokol—first domestic oil burner listed as standard by Underwriters' Laboratories, and approved by all leading safety boards.

DEALER ORGANIZERS

ONE of the largest and oldest manufacturers in the world building Oil Burners, Electric Refrigerators and Water Softeners, now expanding its dealer organization, has positions for a number of high class dealer organizers.

The men we want are salesmen of much more than average ability, with executive instinct. Since they will be "the Company" to the dealers with whom they establish contact, they must be the type of men who think ahead, not as mere salesmen, but, as industrial executives.

Men over 35 years of age, substantial, alert, conscientious, responsible and thoroughly experienced in this type of work are desired.

To those who can meet these requirements, we offer exceptional opportunities.

Inquire direct, giving complete information in first letter. Personal interviews will then be arranged.

Address

WAYNE TANK and PUMP CO.

Fort Wayne, Indiana

80.7% efficiency!

There are "spendthrift" oil burners just as there are spendthrift people. An oil burner that blows heat up the chimney is in the same class as the reckless youth who squanders his dad's hard-earned dollars. Both should be shunned.

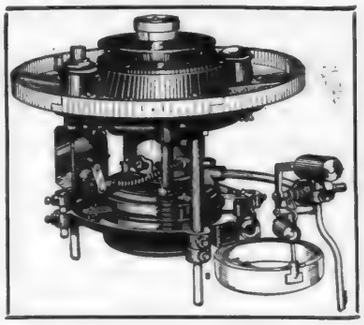
ABC is the Ben Franklin of oil burners. It has no fan or blower to waste heat. That's why it was given the highest heating efficiency rating in the United States Government oil burner test.

Sell the Oil Burner that Squeezes Heat Dollars.

Twelve reasons why an ABC agency makes money

1. **QUIET.** ABC is really quiet. Allowances are not made after installation.
2. **NO CARBON OR SOOT.** Engineers know what an immense advantage this is.
3. **LESS OIL REQUIRED.** Unique means of atomization assures complete combustion. Every particle of oil is burned. The heat rises slowly and is completely absorbed by the boiler.
4. **LONGER BOILER LIFE.** Circular flame, evenly applied all around the boiler, greatly increases its life.
5. **BURNS LOW-PRICED OILS.** ABC burns 28-30 and 32-36 gravity oil.

Passed by New York Board of Standards and Appeals.



6. **ODORLESS.** An ABC heated home is odorless.
7. **NO UNSIGHTLY PARTS OUTSIDE OF BOILER.** This ABC feature has made sales.
8. **SIMPLE.** Only one moving part subject to wear.
9. **NO FAN OR BLOWER.** Heat is not blown up the chimney and wasted. No noisy fan introduces ABC to your guests.
10. **CLEAN.** It's useless to say how clean ABC is. You must see to appreciate.
11. **AUTOMATIC** Heat when you want it—as you want it.
12. **OIL BURNED IN SUSPENSION.**

Approved by Underwriters' Laboratories.

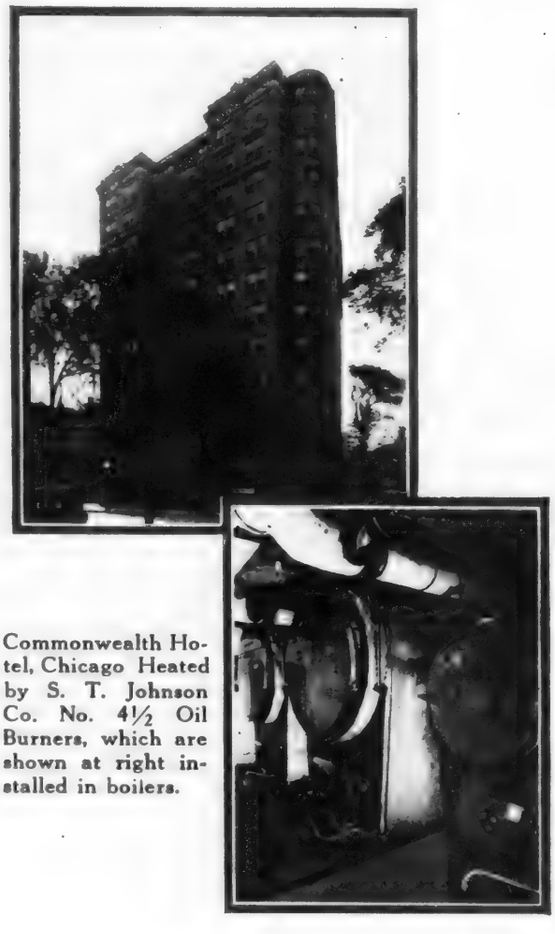
AUTOMATIC BURNER CORPORATION

312 N. May Street, Chicago

ABC OIL BURNER

no noise ~ no carbon

BANISH coal-bins forever. S. T. Johnson Co. Oil Burners are heating hundreds of homes, from Maine to California, efficiently, safely, economically.



Commonwealth Hotel, Chicago Heated by S. T. Johnson Co. No. 4½ Oil Burners, which are shown at right installed in boilers.

JOHNSON OIL BURNERS®

Developed Through 20 Years of Successful Manufacturing

THE improved S. T. Johnson Co. Rotary Oil Burner is backed by 20 years' successful manufacturing experience.

Made in five sizes for both heat and power —with or without oil pump. Engineers pronounce it "the most scientifically constructed oil burner on the market."

Listed as standard by Underwriters' Laboratories. Safe, clean, quiet.

And Now—Automatic Control

THIS famous, proven burner is now available with full automatic control. Positive regulation combined with safety. Greatly broadens the sales field of Johnson dealers. Some attractive territory still open. Write or wire for information. Ask for new booklet.

Main Office and Factory:
940-950 Arlington Street
OAKLAND, CALIFORNIA

S. T. JOHNSON CO.

OIL BURNERS
TRADE MARK REGISTERED

FOR EVERY SERVICE

Distributors and Dealers Throughout the United States and in Foreign Countries

Factory Branch Offices: San Francisco, Sacramento, Philadelphia

Magazine Feed

Oil Burning

FOR ALL TYPES of BUILDINGS
BUNGALOWS
HOMES
APARTMENTS

REDUCE HEATING EXPENSE 50%

WITH NEWPORTS, BURNING No. 1 BUCKWHEAT COAL, COSTING ABOUT $7.00 PER TON

PROSPECTS are today evincing real concern in their choice of heating units.

They demand maximum convenience and are, as well, striving for a means that will reduce to a minimum the appalling yearly item of heating expense.

Uniform, steady heat for long periods is of paramount interest to them.

Heaters of modern design, offering economical operating results, that are adaptable to all sizes and kinds of fuel, coal, coke, or oil, will ultimately be their choice.

Heating contractors now realize that modern day progress has brought about many changes in their respective field of endeavor.

Ordinary surface feed boilers, requiring the larger, more expensive sizes of fuel, and maximum operating attention, must in the interest of economy and convenience give way to other types.

Adopt the NEWPORT and thereby keep abreast of the times, as this wonderful heater offers unmatched heating service.

Many contractors tell us that the satisfaction rendered by thousands of NEWPORTS over the past fourteen years, makes contract closing a pleasure.

MODERATE PRICES PLACE NEWPORTS WELL WITHIN THE REACH OF ALL

NEWPORT

BOILER COMPANY - CHICAGO, ILLINOIS

529 SOUTH FRANKLIN STREET

PRINCIPAL DISTRIBUTING POINTS

New York - Hartford - Boston - Worcester - Albany - Scranton - Lancaster - Philadelphia - Wilmington - Rochester - Buffalo - Cleveland - Minneapolis

Does not interfere with radio reception.

MONROE Oil Pump

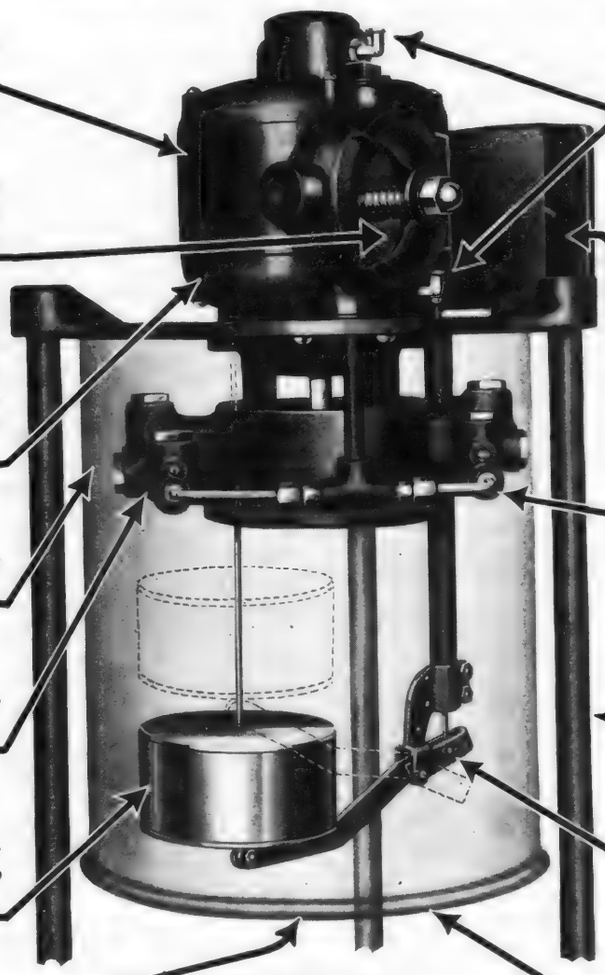
Type TJ

Dependable—quiet—safe guaranteed 5 years.

$75 LIST

Five Year Guarantee

Built on principles proven right in the manufacture of thousands of pumps during the past sixteen years



Inlet to pump from supply tank.

Strainer in suction line easily taken apart and cleaned.

Noiseless Janette Motor, 1750 R.P.M., does not interfere with reception.

Overflow to storage tank.

Double piston type pump.

Large brass float securely fastened to guide rod.

Outlet to burner.

Motor bearing oil cups. Oil at beginning of season.

Switch box—vapor proof. Carbon contact, quick-acting switch. Both switch and contacts patented.

Self-oiling and self-priming pump.

Legs cut from standard ½" conduit pipe—any height desired.

Compound leverage on switch—never fails.

Vapor-proof tank. Made of heavy material.

Ghost view showing strainer, pump and float construction.

MONROE MACHINE TOOL COMPANY

Specify Monroe "TJ" on contracts

NEW YORK SINGER BUILDING 149 BROADWAY

737 W. Jackson Blvd.—CHICAGO

16 YEARS EXPERIENCE MANUFACTURING PUMPS

PHILADELPHIA 437 REAL ESTATE TRUST BUILDING

Order today or write for literature

Stocks carried in New York and Philadelphia

RAYFIELD

PATENTS PENDING

Automatic Fuel Oil Burners

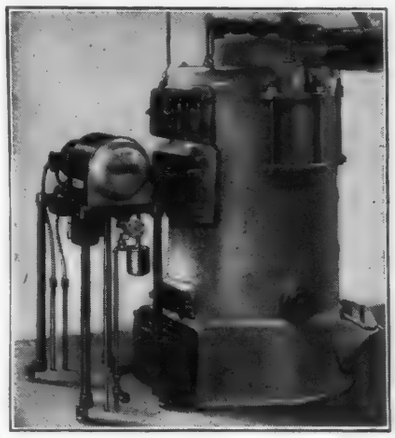
Note These Important Features

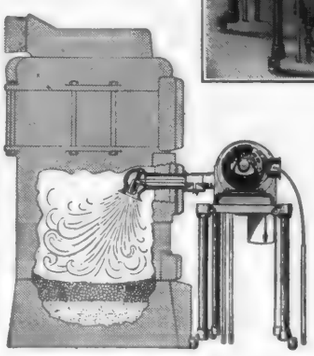
1. Utilizes the Radiant Heat Principle.
2. Positive Electric Ignition.
3. Air-cooled, Non-carbonizing Nozzle.
4. Triple Atomization.
5. Double-Length Flame Travel.
6. No Baffling Walls.
7. Really Quiet (not maybe).
8. Rayfield Flame Safety.
9. Latest Minneapolis Controls.
10. Complete Line—5 sizes.
11. Burns Fuel Oil—28/30 For Homes: Lower Gravities for Factories.

Rayfield's Scientific Combustion

Note the illustration. The nozzle is suspended over the fire pot. The vapor, burning in suspension, is forced directly downward to the crushed fire brick at the bottom, then deflected to the sides and rises evenly along the walls of the fire box before the generated heat escapes through the flue. In this manner the flame travels twice the usual distance in the fire box, giving off the maximum heat at the bottom of the fire box and completing combustion before reaching the flue.

The Radiant Heat principle is utilized through the bed of crushed fire brick placed in the ash pit. In operation this brick quickly becomes incandescent, absorbing and holding the heat that would otherwise be lost up the chimney. Long after the burner has been shut off by the thermostat, this white-hot bed of crushed brick continues to radiate its stored heat and thus assists in maintaining an even temperature throughout the building.





The Rayfield is a Super-system of heating designed and developed by Chas. L. Rayfield, inventor of the well-known Rayfield Carburetor for automobiles, and an acknowledged authority on the combustion of liquid fuels.

Built by Engineers—Approved by Men Who Know the Heating Business

Heating plant engineers, manufacturers and oil-burner men quickly approve the Rayfield after inspection and testing.

These men came to see what we have. Some of them were open-minded, some were not. They witnessed demonstrations, inspected burners in operation, talked to users and made tests under their own conditions.

As a result of their observations they report that the Rayfield is:

—a simple and quiet power burner

—correct from an engineering standpoint

—equipped with remarkable safety controls.

You are invited to make a similar investigation of the Rayfield, and you should do it if you are following the trend of the heating trade toward oil burning.

For Steam, Vapor, Hot Water, Hot Air

The Rayfield is fully automatic and operates successfully in any good heating plant. It comes in various sizes and has had three years of practical tests in homes, apartments, theatres and factories.

You have been waiting a long time for this scientific oil burner—a burner that you would readily install in your own home after seeing a demonstration.

Send for illustrated circular.

Rayfield Mfg. Co.

21st and Rockwell Sts. CHICAGO

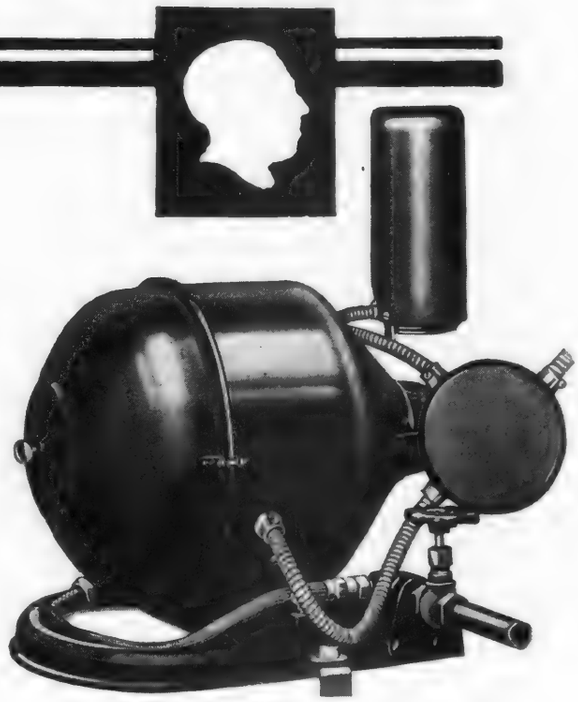
Listed as Standard by the Underwriters' Laboratories

Contractor-Dealers Wanted

The Rayfield franchise will appeal to men who know the heating business. A profitable connection is offered responsible parties who are prepared to demonstrate, sell and install our equipment. Write for territory and further particulars.

Announcing the new

CROSLEY



Powel Crosley, Jr.'s, Unique Device

The new Crosley Oil Burner answers the demands for REASONABLY priced, safe, sure automatic heat that was created when the first attempt to burn oil mechanically promised a deliverance from the dirt and drudgery of coal.

Elaborate mechanism—intricate parts and heavy construction have been eliminated by unique engineering methods—thus reducing costs materially.

By simplicity of design—standardization of production and assembly, Crosley offers efficiency and security at a price destined to hasten the popularization of oil burners.

Crosley creates a new oil burner and a new market.

Everybody wants an oil burner just as everybody wants an automobile, and Crosley clears away for millions their one objection—high price.

In a great survey among thousands of satisfied oil burner owners the chief reasons for their purchase were found to be these five:

1. Cleanliness
2. Convenience
3. Elimination of Labor
4. Uniformity of Heat
5. Economy

And when you consider the thousands that have not yet bought oil burners because price has prevented, you get some idea of the potential market created today at your door by Crosley's device, so far below the usual price for completely automatic heat.

Outstanding features

Positive ignition from electric arc.
Self priming centrifugal pump.
Only two moving parts.
Crosley clarifier for radios.
Master switch (time limit).
Entire burner in two factory-assembled and tested units completely enclosed in metal housings.

Service is no problem

There is no complicated mechanism to get out of order. Every function of the burner is positive. There are only 2 moving parts—the motor shafts. Installation is easy. The burner is in two completely factory-assembled parts—one placed in front of the furnace—nothing inside—and the other on the wall. Simple pipe connection and wiring.

On these features Crosley dealers will make success. Simplicity has killed the "service" bugbear.

Cincinnati

THE CROSLEY RADIO

OIL BURNER

$330.

F.O.B. Cincinnati. Complete with room thermostat, pump and electric ignition. Can be installed profitably with tank under $450.

J. H. Stewart designed it.

This burner is born of the problems of oil burner installations for the past 10 years.

As a graduate engineer, J. H. Stewart's oil burning experiences in the past ten years have covered every phase of this industry from designing to the problems of installation and service.

Trouble in an oil burner has always been in ratio to its complications. Simplicity has been Stewart's goal. He has surely reached it in this new burner that has but two moving parts—the motor shafts. No gears, rods, cams or intricate mechanisms play any part in the simple positive operation of this efficient burner.

Crosley radio methods indicate success.

Powell Crosley, Jr.'s, radio achievements are so well known that his advent into the oil burner field is looked upon with more than ordinary expectancy. He has so consistently done in big ways the things the radio industry has declared impossible that his activities with oil burners can be expected to turn lots of old theories upside down and to obsolete many commonly accepted practices.

The Crosley claim to radio manufacturing leadership lies in his standardization of manufacturing details. Such mass production methods which have been responsible for good radios at prices everyone could afford, now applied to oil burners, open a greater market of millions in potential business heretofore untouched.

Profit is right

The Crosley oil burner was shown at the Oil Burner Show in Detroit, April 6, 7 and 8th. Men of reputation and standing in the industry studied it long and thoroughly. Its methods of overcoming old problems with new features won enthusiastic admiration. Many dealers of long experience spoke for first opportunities in their communities.

Crosley acceptance is national

The Crosley Oil Burner agency as a business is to be compared with an agency for a fast selling automobile. It cannot be handled from the curb-stone, but is a substantial business proposition.

We are desirous of entering into correspondence with responsible business men who feel that they can operate such a business successfully.

If you are interested in this proposition, we urge you to write, giving us full details of your experience, the business in which you are engaged, and your facilities. Eventually it will probably be advisable for Dealers having the necessary qualifications to visit the factory in order to complete final arrangements. It will be wise at that time to have the man who will have charge of installation and service visit the factory and attend our school for about a week.

CORPORATION—Oil Burner Division Cincinnati

Wiley

Safety-Vent Vapor Regulator

POWER IS ITS MIDDLE NAME

Makes any Vapor or Modulating System safe and satisfactory. Sensitive to the slightest change in pressure. Has ample power to control the dampers with a good working margin.

Full power of regulator is exerted within a pressure range of two or three ounces.

The Safety Vent Valve is a distinguishing feature of this regulator and takes care of air from entire heating system.

Tested and carefully adjusted before leaving factory, ready to be connected up and put into service, with the least trouble and expense.

All working parts of cast bronze. Will last as long as the boiler, or any other part of system.

Write for details

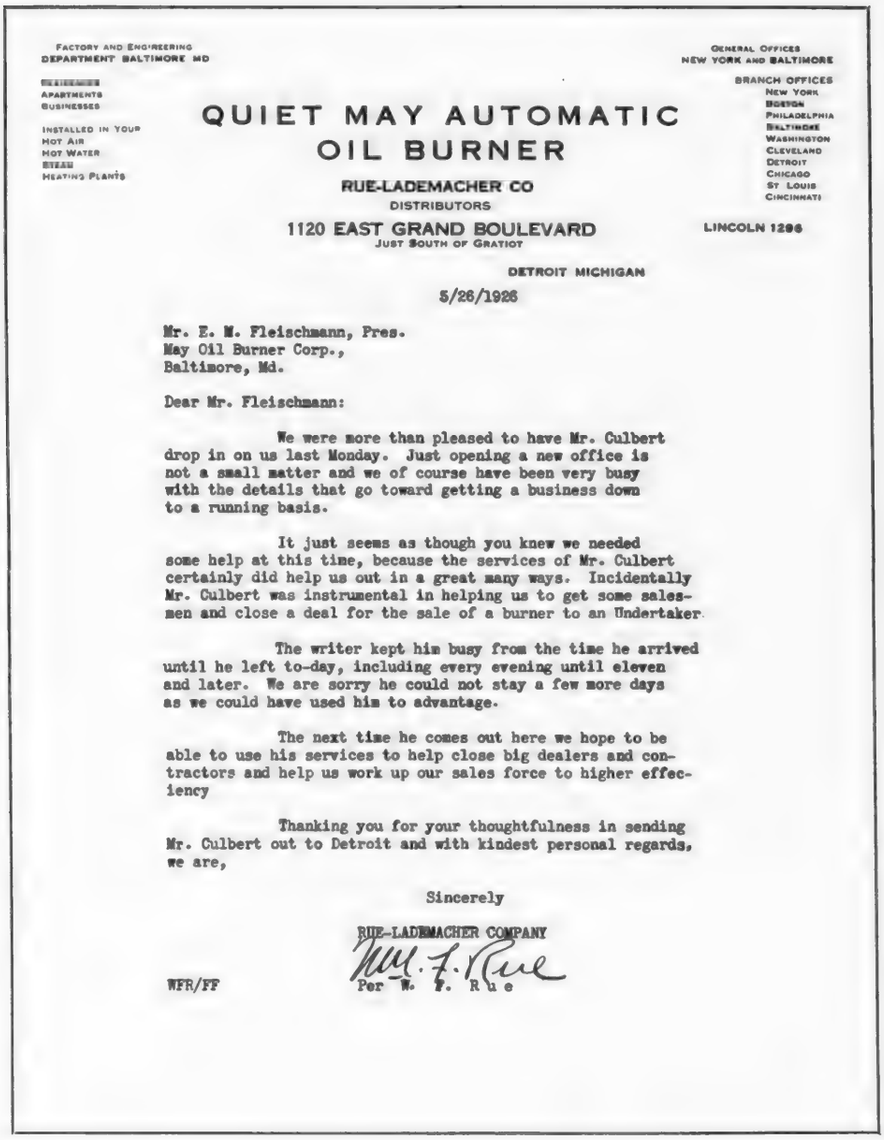
SIMPLEX HEATING SPECIALTY COMPANY, Inc.
LYNCHBURG, VA.

Sterlco
TRADE MARK

The past heating season has proven the efficiency of the Type-B Thermotrol and demonstrated its qualities as a room temperature regulator.

We now announce the new model Thermotrol, improved in appearance, more smooth in operation, yet maintaining the same principle as the original Thermotrol. Write for Bulletin No. 38.

STERLING ENGINEERING COMPANY
1626-44 Holton St., Milwaukee, Wis.



FACTORY AND ENGINEERING DEPARTMENT BALTIMORE MD

RESIDENCES APARTMENTS BUSINESSES

INSTALLED IN YOUR HOT AIR HOT WATER STEAM HEATING PLANTS

GENERAL OFFICES NEW YORK AND BALTIMORE

BRANCH OFFICES NEW YORK BOSTON PHILADELPHIA BALTIMORE WASHINGTON CLEVELAND DETROIT CHICAGO ST LOUIS CINCINNATI

QUIET MAY AUTOMATIC OIL BURNER

RUE-LADEMACHER CO
DISTRIBUTORS

1120 EAST GRAND BOULEVARD
JUST SOUTH OF GRATIOT

LINCOLN 1296

DETROIT MICHIGAN

5/26/1926

Mr. E. M. Fleischmann, Pres.
May Oil Burner Corp.,
Baltimore, Md.

Dear Mr. Fleischmann:

We were more than pleased to have Mr. Culbert drop in on us last Monday. Just opening a new office is not a small matter and we of course have been very busy with the details that go toward getting a business down to a running basis.

It just seems as though you knew we needed some help at this time, because the services of Mr. Culbert certainly did help us out in a great many ways. Incidentally Mr. Culbert was instrumental in helping us to get some salesmen and close a deal for the sale of a burner to an Undertaker.

The writer kept him busy from the time he arrived until he left to-day, including every evening until eleven and later. We are sorry he could not stay a few more days as we could have used him to advantage.

The next time he comes out here we hope to be able to use his services to help close big dealers and contractors and help us work up our sales force to higher effeciency

Thanking you for your thoughtfulness in sending Mr. Culbert out to Detroit and with kindest personal regards, we are,

Sincerely

RUE-LADEMACHER COMPANY

Per W. F. Rue

WFR/FF

Are *you* getting *such* co-operation?

BECAUSE our dealers secure a closer co-operation from us than even they expect, they find it easy to build up a profitable and steadily growing business with Quiet May Oil Burners. The letter which we are reprinting shows the service we give.

Let us tell you more about the Quiet May. Let us explain why our special dealer finance plan and our consumer deferred payment plan will increase your profits and bring you bigger business. Write us today for full information! Address May Oil Burner Corporation. *Factory and Main Offices,* Baltimore, Maryland. *Branch Offices,* 331 Madison Ave., New York; 1020 Commonwealth Ave., Boston; 2401 Chestnut Street, Philadelphia; 503 Security Bldg., St. Louis.

Quiet May

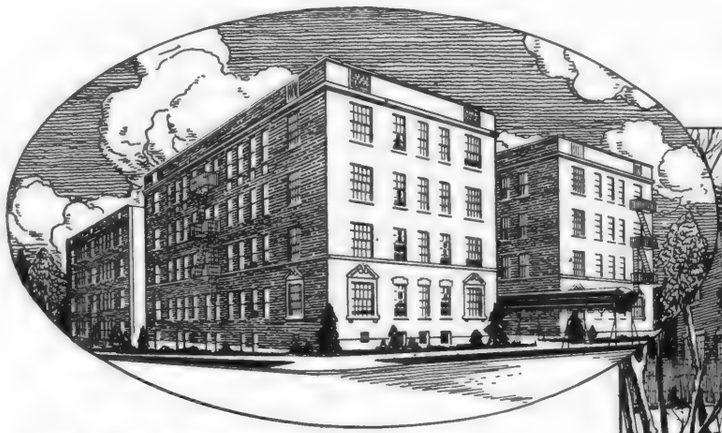
QUIET MAY OIL BURNER AUTOMATIC

AUTOMATIC

OIL BURNER

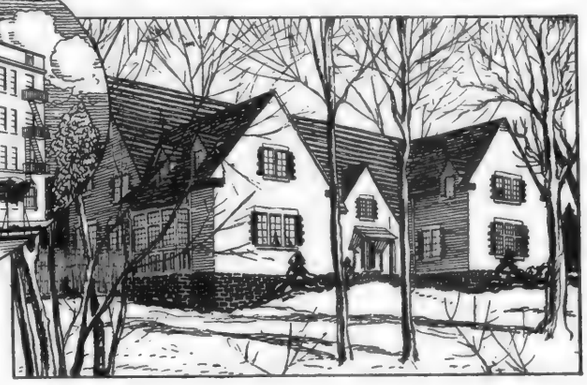
GO AFTER THE BIG JOBS THIS MONTH

Here is an oil burner that will give you lots to talk about when you approach careful buyers



Above are the Folpad Apartments, Northern Blvd. & Percy Street, Flushing, Long Island. Two complete sets of CALOROIL BURNERS are heating this building.

Below is residence of F. Burnham Chapman, Architect, Rye, New York. This house has been heated with CALOROIL equipment for four years.



This is the best time of year to devote to selling large installations. Domestic sales slow up a bit during the hot weather, but commercial prospects are anxious to put in oil burners and put heating off their minds before the cold weather comes. As an all-year-round proposition, Caloroil is the best bet among oil burners.

When you are trying to sell a big installation, there is usually competition and lots of it. If you are selling Caloroil Burners, you'll thrive on competition. Caloroil gives you lots to talk about. This burner is *efficient, economical, simple, noiseless, clean.*

We would like to tell you about the Caloroil Franchise for your city, to tell you the whole story of this wonderful burner, to tell you how we cooperate with dealers and advertise for them. Caloroil Burner Corporation, Dept. C3, 5 East 40th Street, New York City.

Caloroil 68°-72°

The "BALANCED TEMPERATURE" *Oil Burner*

(Member of the American Oil Burner Association)

Residence of Mr. John Nyden, Architect, Evanston, Ill. C. J. McDonough Company, Heating Contractors

—when the profession builds for itself!

IN THIRTY-EIGHT YEARS more than thirty-seven thousand Webster Systems of Steam Heating have been installed in hotels, schools, office buildings—apartments and private residences . . . In our files of completed work are the names of buildings of national and international fame . . . Yet, nothing in our records do we prize more highly than the long and growing list* of Webster Systems of Steam Heating installed by architects, engineers and heating contractors in their *own homes and business properties.*

NEW!

Have you a copy of the new Webster Sylphon Trap Catalogue? It describes this vital element of Webster Systems in detail, gives ratings and other data. Send for it to bring your files up to date.

Ask for Bulletin No. 701-A

**List will be furnished on request.*

Warren Webster & Company

Pioneers of the Vacuum System of Steam Heating

Camden, N. J. 50 Branch Offices

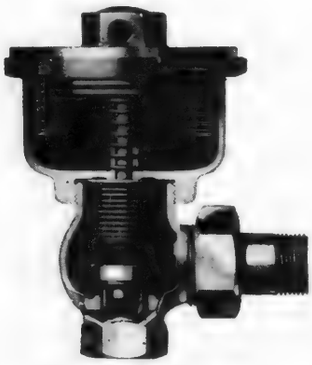
In Canada, Darling Bros., Ltd., Montreal

- since 1888

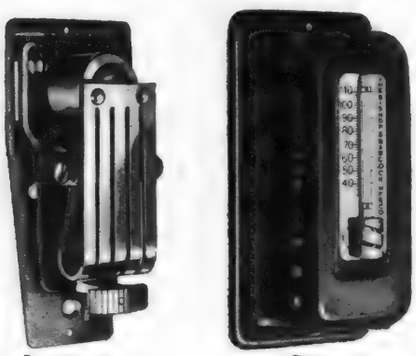
Webster Systems of Steam Heating

More than 37,000 installations in America's finer buildings

Exact----throughout the years



Bishop & Babcock
Multiflex Pnuematic Valve



Instrument Cover

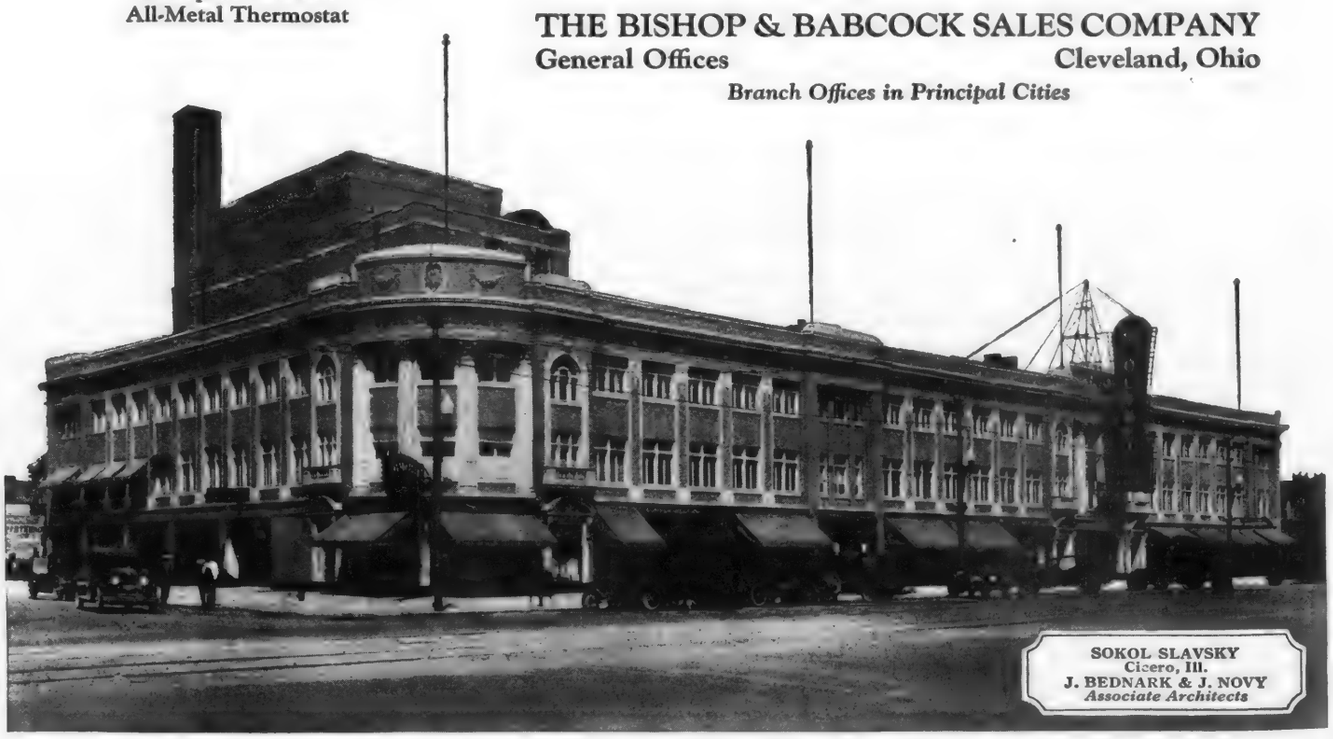
Bishop & Babcock
All-Metal Thermostat

HUNDREDS of installations, many of which have been in constant use for more than 10 years—in schools, churches, hotels, office buildings, apartments and other large buildings—attest to the popularity and serviceability of Bishop & Babcock Temperature Control Systems.

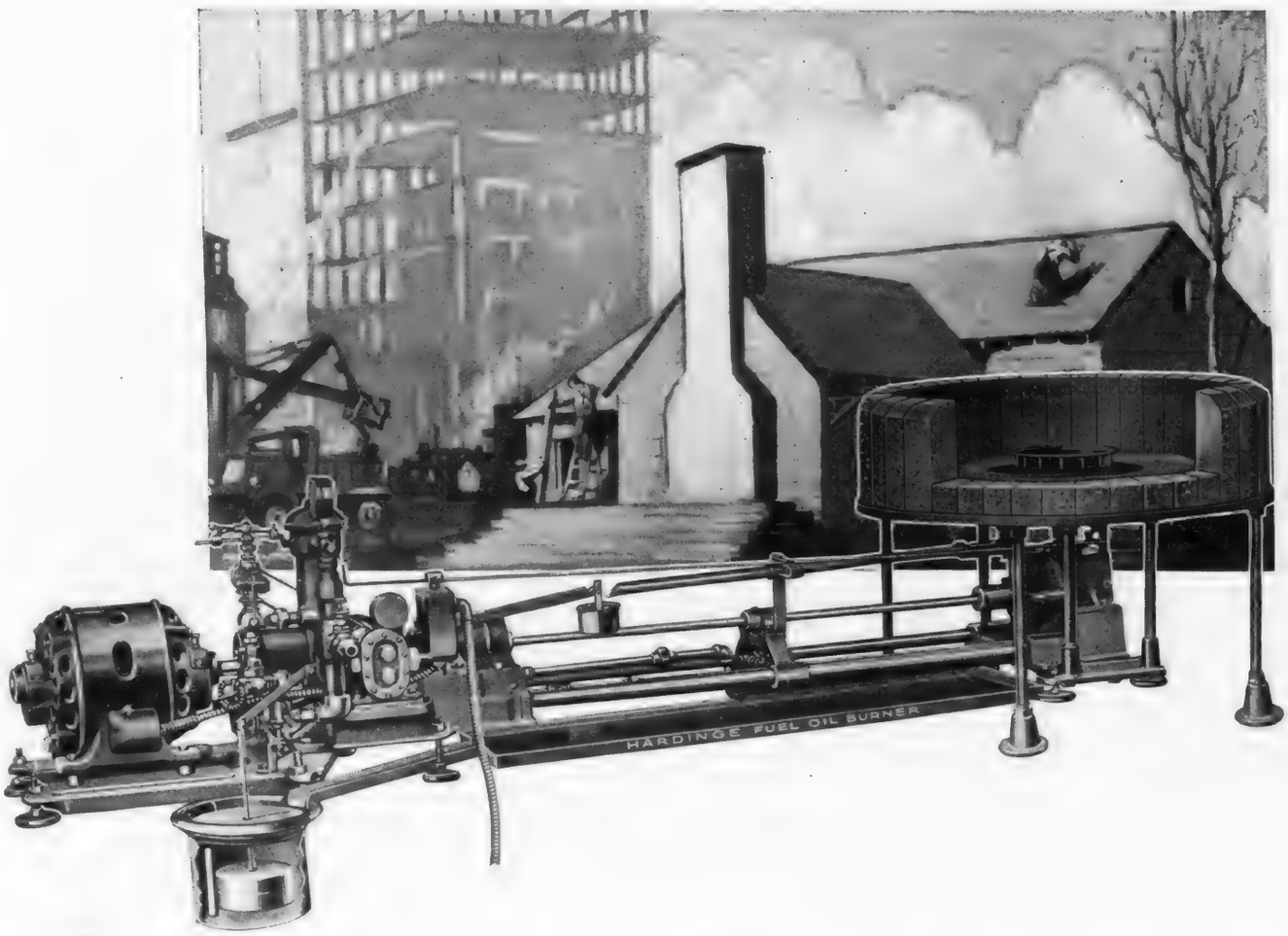
Bishop & Babcock Temperature Control Systems are complete, efficient and economical. Architects, Heating Contractors and Engineers are invited to call upon our Engineering Department for suggestions and data concerning Temperature Control Apparatus.

Our Engineering Data Book, pocket edition, will be mailed on request. A new catalog and data book covering Massachusetts Fans and Blowers is just off the press—shall we mail you a copy?

THE BISHOP & BABCOCK SALES COMPANY
General Offices **Cleveland, Ohio**
Branch Offices in Principal Cities



BISHOP & BABCOCK
TEMPERATURE REGULATION



from Bungalow *to* Skyscraper

Hardinge Fuel Oil Burners are used successfully on all types of buildings —from the small bungalow to the mammoth skyscraper. That's one of the reasons why Hardinge dealers are kept busy the year 'round.

There are several reasons why conscientious dealers insist on the Hardinge.

The Hardinge is guaranteed for ten years. Both domestic and industrial burners are listed as standard by the Underwriters' Laboratories and the Board of Standards and Appeals of New York. The Hardinge is economical, practically noiseless and dependable. It is manufactured by a concern whose name and products are known throughout the world.

This is especially important to dealers. Nowhere in the Hardinge contract will you find definite specifications relative to the number of burners to be purchased with the signing of the contract. Dealers are not required to order any definite number of burners, as the burners will be shipped only as required. We invite those who can qualify to join the ever-increasing list of Hardinge dealers.

HARDINGE BROTHERS, INC., 4149 Ravenswood Ave., Chicago

HARDINGE

FUEL OIL BURNER

THERMOSTATIC TRAP

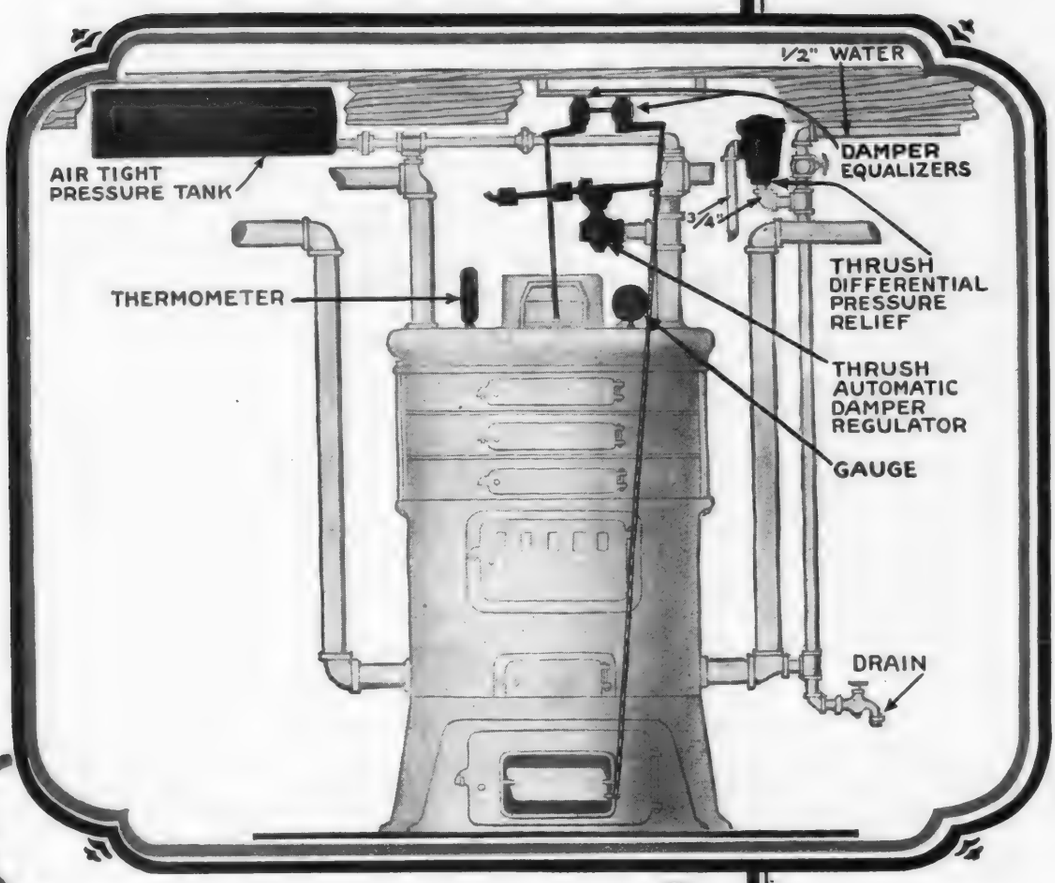
Conceived, designed and built to a purpose — the elimination of trap troubles — the ***Milvaco Thermostatic Trap*** embodies in its detail of construction, principal of operation, and accomplishment of purpose, a standard synonymous to the Milwaukee Valve Company.

Backed by twenty-five years of manufacturing experience —A message with a meaning to the discriminating buyer.

Bulletin No. 23 descriptive in detail of the Milvaco Thermostatic Trap will gladly be mailed you upon request.

MILWAUKEE VALVE CO.

MILWAUKEE, WISCONSIN, U. S. A.



Safe!

HERE is the most dependable method of controlling hot water heating. Thrush equipment makes a closed system automatically regulated from any gravity job. Only six feet of pipe and eight fittings needed to install. Saves fuel, saves trouble.

H.A.THRUSH & CO.

Peru, Indiana.

Thrush Automatic Damper Regulator provides uniform temperature in all kinds of weather with very little attention.

Thrush Differential Pressure Relief provides positive safe overflow. Maintains additional pressure on system, relieving excess pressure instantly.

THRUSH SYSTEM OF HOT WATER HEATING.....!

The Discobolus, one of the most famous bronzes of antiquity, was a life-size figure glorifying the Olympian athlete. Although the original has been lost, four contemporary bronze or marble copies are in existence

The bronze-bodied Dunham Thermostatic Radiator Trap is cast in pleasing lines which combine beauty and utility. As in the sculptor's statue the enduring bronze perpetuates the original idea of the designer.

Look for the name DUNHAM

This nameplate identifies a genuine Dunham Thermostatic Radiator Trap. It is placed on the Dunham Trap for your protection and it is your assurance of the Dependability and Satisfaction which characterize Dunham Heating Service.

Why Bronze?

THERE is no argument about the use of bronze as a material for the construction of that which is designed to last.

Bronze *endures.*

The body of the Dunham Thermostatic Radiator Trap is made of bronze because there is no other metal known which will serve so long and so well. Our research covering nearly a quarter century has revealed nothing to take its place. Certainly iron and brass do not, and cannot, equal bronze in lifetime wear and service.

Then, too, bronze has been found the ideal metal for use in radiator traps to resist the action of water, air and steam, and the destructive forces present when water is converted into vapor by heat.

If you should examine the condition of brass and cast iron trap bodies after several years of use, you would realize why Dunham Traps are made of bronze, the metal that endures.

There is no substitute for bronze—nothing "just as good." Man's handiwork in bronze has come down to us through the ages, while craftsmanship expressed in less enduring metals has vanished into dust.

Over sixty branch and local sales offices in the United States and Canada bring Dunham Heating Service as close to you as your telephone. Consult your telephone directory for the address of our office in your city.

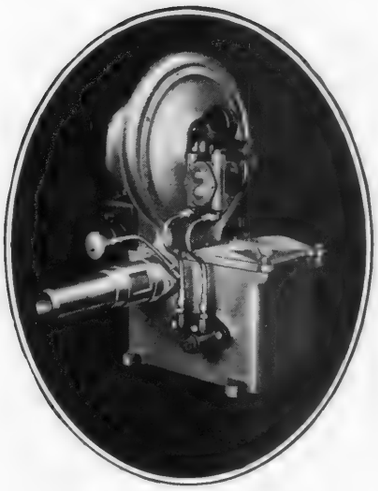
C. A. DUNHAM CO.

DUNHAM BUILDING

450 East Ohio Street ~ ~ Chicago

Wanted . . . .

qualified dealers to sell this remarkable domestic oil burner



Nine reasons why Petro is safe, silent and reliable.

1. Compact unit—everything mounted on a single base.
2. No parts inside the fire box of the boiler or furnace subject to the heat of combustion.
3. Vacuum oil pump an integral part of the burner.
4. Air register for admitting proper amount of air to suit size of boiler and draft conditions.
5. Alemite lubrication for the four moving parts, sufficient for a year's operation.
6. Patented anti-siphon valve, preventing any possibility of oil leaks.
7. Patented combustion control which makes its performance absolutely safe.
8. Fifteen-day clock thermostat which automatically regulates the temperature during the night as well as the day and economizes on fuel.
9. Patented Masterstat mounted on the boiler which will shut off the burner automatically if there is no water in the boiler.

The Petroleum Heat and Power Co. — 20 years in the oil burner business — is now selecting dealers in all parts of the country.

THE Petroleum Heat and Power organization dates back to 1903, when the Fess System Company was organized in San Francisco. This company manufactured and installed thousands of burners on the Pacific Coast.

The Petroleum Heat and Power Company was organized in 1915 on the Atlantic Coast. The Fess System Company is now a subsidiary company. The Petroleum Heat and Power Company is firmly established. It has ample financial backing. Its board of directors consists of Robert Adamson, Andrew Adie, T. Coleman DuPont, W. C. Durant, Frederic Ewing, F. Murray Forbes, W. Cameron Forbes, John A. Harriss, Alfred O. Hoyt, Reginald H. Johnson, Louis G. Kaufman, W. C. McTarnahan, Bradley W. Palmer, R. G. Stewart.

The Petroleum Heat and Power Company has made over 1500 large installations in New England alone. Every type of industry is included in this number. Among the installations are Harvard University, Metropolitan Life Insurance Building, the Equitable Building, the Ritz Carlton and the Providence-Biltmore Hotel and many other equally well known buildings.

And now the "Petro"

For years this company has been perfecting a domestic oil burner. The result of this study and development is the perfected Petro Burner. Today the Petro is in actual operation in hundreds of homes. Heating experts everywhere praise it in the highest terms. They call it the "perfect burner."

The Petro is now being manufactured in large quantities. It is being sold and installed by the company in New York, Boston, Providence, Stamford, San Francisco, Los Angeles, Seattle and other cities. Production has reached the point where it is possible to take on dealers in other territories.

We want dealers in all parts of the country. But they must be men who can satisfy our standards. No dealer will be selected who is not qualified by his standing in the community — his financial soundness—and his ability to give customers the highest-class service. Those who can not meet these qualifications will not be considered.

An unusual opportunity

The men who are selected are certain to reap a handsome profit. They will be given the closest possible cooperation. They will be assured prompt deliveries. And their selling efforts will be backed up by powerful, convincing advertising.

If you feel yourself qualified and equipped to meet our requirements, use the coupon below. But don't put it off. Applications will be considered in the order that they are received.

PETRO

RESIDENCE OIL BURNER

A product of

PETROLEUM HEAT AND POWER COMPANY

Main Office: 511 Fifth Avenue, New York

Petroleum Heat and Power Company
511 Fifth Avenue
New York City

Gentlemen:

I am interested in becoming a dealer for the Petro Residence Oil Burner. Please send me an application blank and further information.

Name.....

Street.....

City.....State.....

ILLINOIS
HEATING SYSTEMS
PREFERENCE
MULTIPLIED many hundreds of times, this background of successful installations amply proves the nation-wide preference for ILLINOIS HEATING SYSTEMS.
Investigate their outstanding merits which they are demonstrating year after year in EVERY type of building.
[Write for Bulletin 21 that gives description of mechanical details]
ILLINOIS ENGINEERING COMPANY
ROBT. L. GIFFORD. PRES. INCORPORATED 1900
BRANCHES AND REPRESENTATIVES IN 40 CITIES
CHICAGO

The three buildings that comprise the Belmont County Infirmary.

Htg. Contractor: Jas. R. Fitton, Bellaire, Ohio.

This advertisement is No. 5 of the Trane Undivided Responsibility Series.

Trane Undivided Responsibility Heating in 50-year-old Belmont County, Ohio, Infirmary

This installation has the equivalent of 15,000 sq. ft. of radiation, taken care of by three cast iron boilers having a total of 27,000 sq. ft. The piping is arranged so that by opening or closing a few valves the system can be operated as a vacuum system using the Trane Return Line Duplex pumps, or it can be operated as a vapor system using Trane Direct Return Traps. The pumps have a rated capacity of 12,000 sq. ft. each. 175 Trane Bellows Traps, and 155 Trane Valves are used. The three buildings in this group are connected with the boilerhouse by tunnels, the farthest radiator being 500 ft. by pipe line from the boilers.

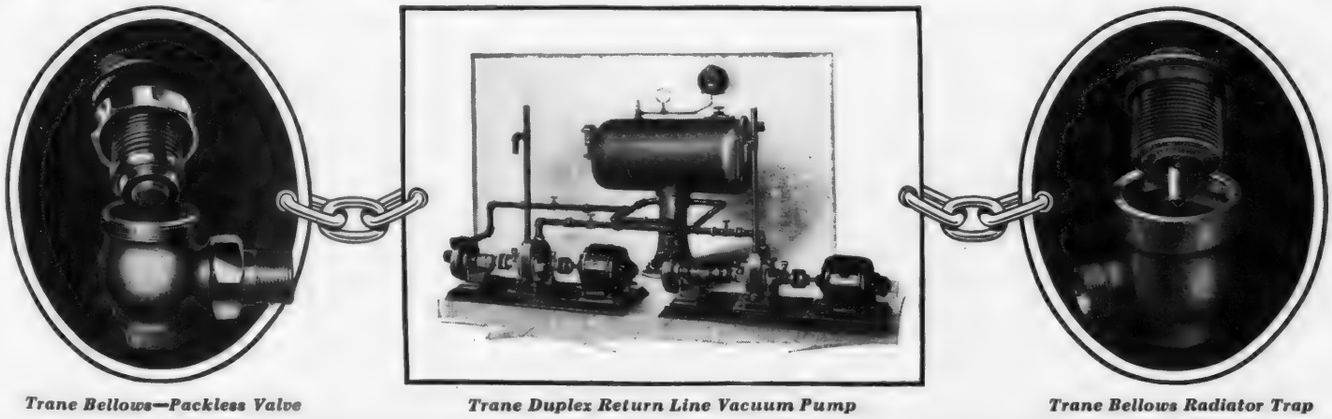
Mr. Fitton, the contractor, received the following letter from the commissioners of Belmont Co.:

"We desire to advise you that the Trane System installed in the Belmont County Home is certainly 100% perfect and is doing everything that you and the Heating Engineer claimed for it. We have no hesitation in recommending either the system or you as the heating contractor who installed it to any who are interested in getting the best."

Mr. Fitton also received a letter from Supt. Moon of the Infirmary, telling of the satisfactory, economical, and efficient service by the system, and closing by saying "I can recommend this system as the best for we have three warm buildings and no worry."

This freedom from worry is one of the nicest things about Trane Undivided Responsibility Heating. Let us tell you more.

The Trane Company, 206 Cameron Ave., La Crosse, Wis., manufacturers of vapor and vacuum heating specialties and pumps. Branches and sales connections at New York, Chicago, Boston, Cincinnati, Newark, Philadelphia, Buffalo, Cleveland, Detroit, Seattle, Los Angeles, Albany, Minneapolis, Salt Lake City, Greensboro, N. C., Zanesville, Ohio, Tampa, Fla., Baltimore, Md., Des Moines, Ia., New Haven, Conn., Sheboygan, Wis., Kansas City, Mo. In England: 22-23 Clerkenwell Close, London, E. C. 1. In Canada: The Trane Co., 21-23 River St., Toronto, 2; Thomas Robertson & Co., 134 Craig St. West, Montreal; F. S. Murdoch, 310 Breadalbane, Winnipeg; A. B. Madden, 48 Sparks St., Ottawa. In China: C. J. Doughty & Co., 7 Jinkee Road, Shanghai.



Trane Bellows—Packless Valve *Trane Duplex Return Line Vacuum Pump* *Trane Bellows Radiator Trap*

The new residence hotel, corner Park & Sproat, Detroit, Mich. Louis Kamper, Architect; Pittlekow Heating & Engineering Company, Heating Contractors.

Arco Packless Valves for steam, water or vapor, are made in angle, corner and globe patterns. Name on dial, if desired.

Modern all the way through!

so, of course—

ARCO Packless Valves

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So, naturally, when it came to the specification of radiator valves, Arco Packless Valves were selected for every one of the 450 radiators. And they brought these four advantages:

1 Arco Packless Valves are good looking. They add a finishing touch of smartness to a radiator.
2 They pay for themselves by saving the annual expense of repacking.
3 They prevent leaks—one of which may cost more than all the valves in the building.
4 They add to the comfort of the owner or his tenants. Arco Packless Valves open with one smooth turn.

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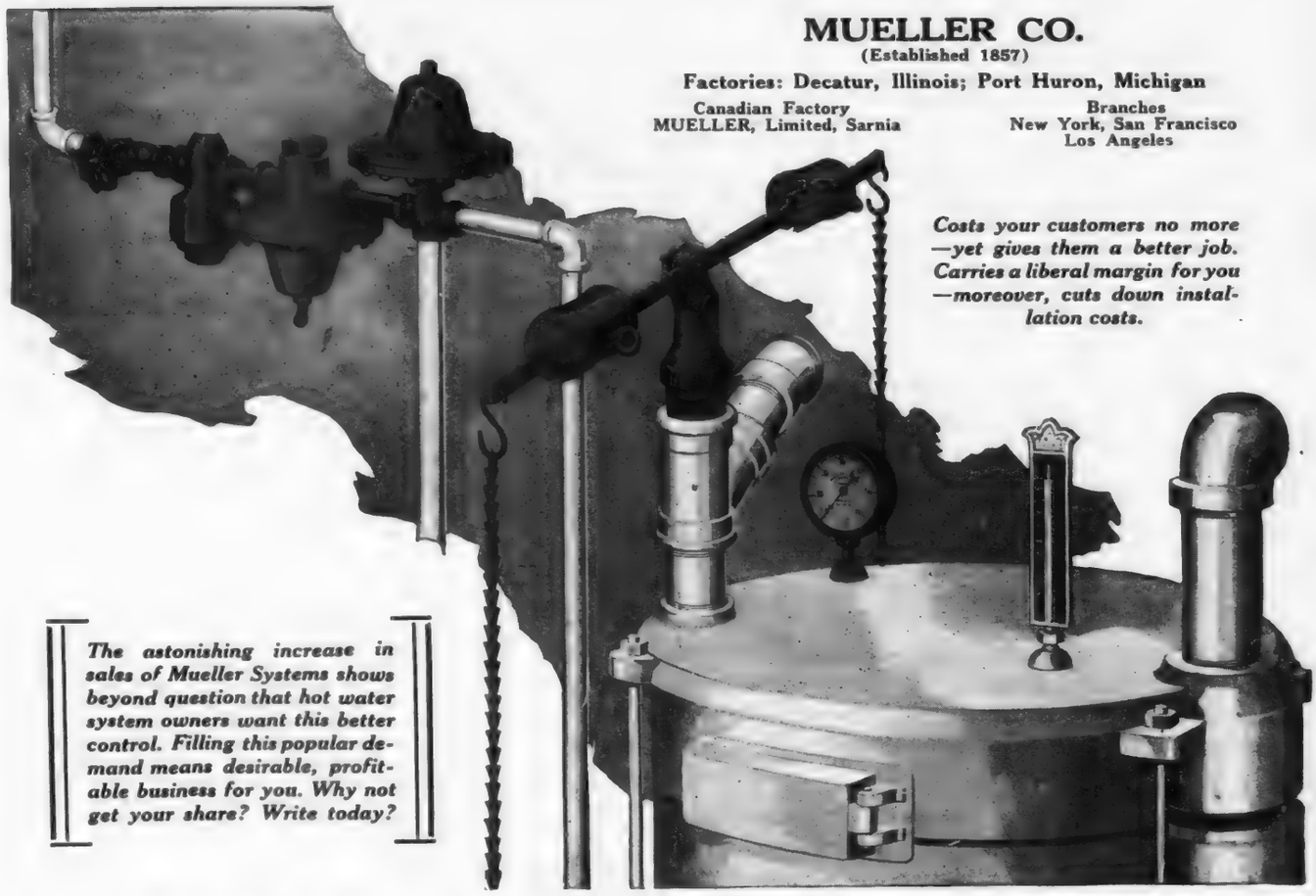

Costs your customers no more —yet gives them a better job. Carries a liberal margin for you —moreover, cuts down installation costs.

The astonishing increase in sales of Mueller Systems shows beyond question that hot water system owners want this better control. Filling this popular demand means desirable, profitable business for you. Why not get your share? Write today?

MUELLER

Automatic Heat Control System

285

A typical installation of Visible Heat Cabinets. These cabinets are available in a wide range of sizes and styles.

Trane Heat Cabinets

Trane Heat Cabinets take the place of radiators. They were invented by Reuben N. Trane and developed and perfected in the Trane Engineering Laboratories to meet the demand for an improved method of distributing heat.

The Heat Cabinet is a new application of convection heating. In effect, the heat is bottled up in the Cabinet and is released only in sufficient quantities to care for the demand. The Cabinet gives heat instantly when desired, or by merely adjusting a damper it can be turned off so that no heat units escape to the room.

As shown by the illustration above, a Heat Cabinet looks somewhat like a radiator enclosure. The principle of operation and the features of the Heat Cabinet, however, are vastly different than those of enclosed radiators.

Heat Cabinet deliveries start in September. Orders received now will be acknowledged with approximate shipping date. Prompt delivery is assured on orders that come in early.

All heating systems that use Heat Cabinets are known as Cabinet Heating Systems. Cabinet Heating can be used in connection with regular steam, vapor, vacuum, or hot water heating equipment. No special design is necessary. No special heating system is necessary. The Cabinets are easily installed on any job where radiators could be used, or where radiators are used at present.

Their many good points are discussed at length in the pages of the Trane Heat Cabinet Catalog—their pleasing appearance, their light weight, their moderate cost, and above all, the perfect heat control that is made possible by the Heat Cabinet principle.

If you haven't received your copy of this catalog, write for it.

The Trane Company, 206 Cameron Ave., La Crosse, Wis., manufacturers of vapor and vacuum heating specialties and pumps. Branches and sales connections at New York, Chicago, Boston, Cincinnati, Newark, Philadelphia, Buffalo, Cleveland, Detroit, Seattle, Los Angeles, Albany, Minneapolis, Salt Lake City, Greensboro, N. C., Zanesville, Ohio, Tampa, Fla., Baltimore, Md., Des Moines, Ia., New Haven, Conn., Sheboygan, Wis., Kansas City, Mo. In England: 22-23 Clerkenwell Close, London, E. C. 1. In Canada: The Trane Co., 21-23 River St., Toronto, 2; Thomas Robertson & Co., 134 Craig St., West, Montreal; F. S. Murdoch, 310 Breadalbane, Winnipeg; A. B. Madden, 48 Sparks St., Ottawa. In China: C. J. Doughty & Co., 7 Jinkee Road, Shanghai.

Heating Hotels

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New Parker House—Boston

Desmond & Lord, *Architects*—Geo. A. Fuller, *Gen'l Cont.*—Cleghorn Co., *Htg. Cont.*

IN heating hotels with ordinary heating systems, the consumption of fuel is beyond the control of the management and entirely in the hands of the hotel guests. Guests often waste heat—and in doing so—waste fuel.

With the Barnes & Jones System, control of the heat by the guests is so easy and simple that very little heat is wasted. A single valve—the Barnes & Jones Modulation Valve—turns the heat on or off so that as much or as little of a radiator may be heated as is necessary for constant comfort.

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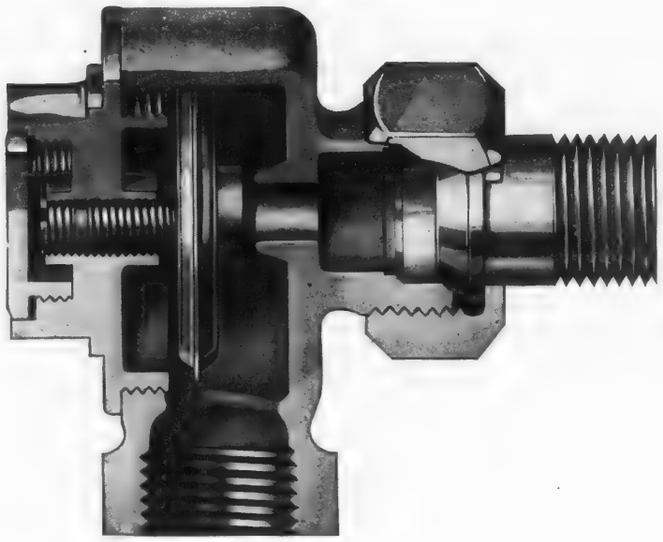

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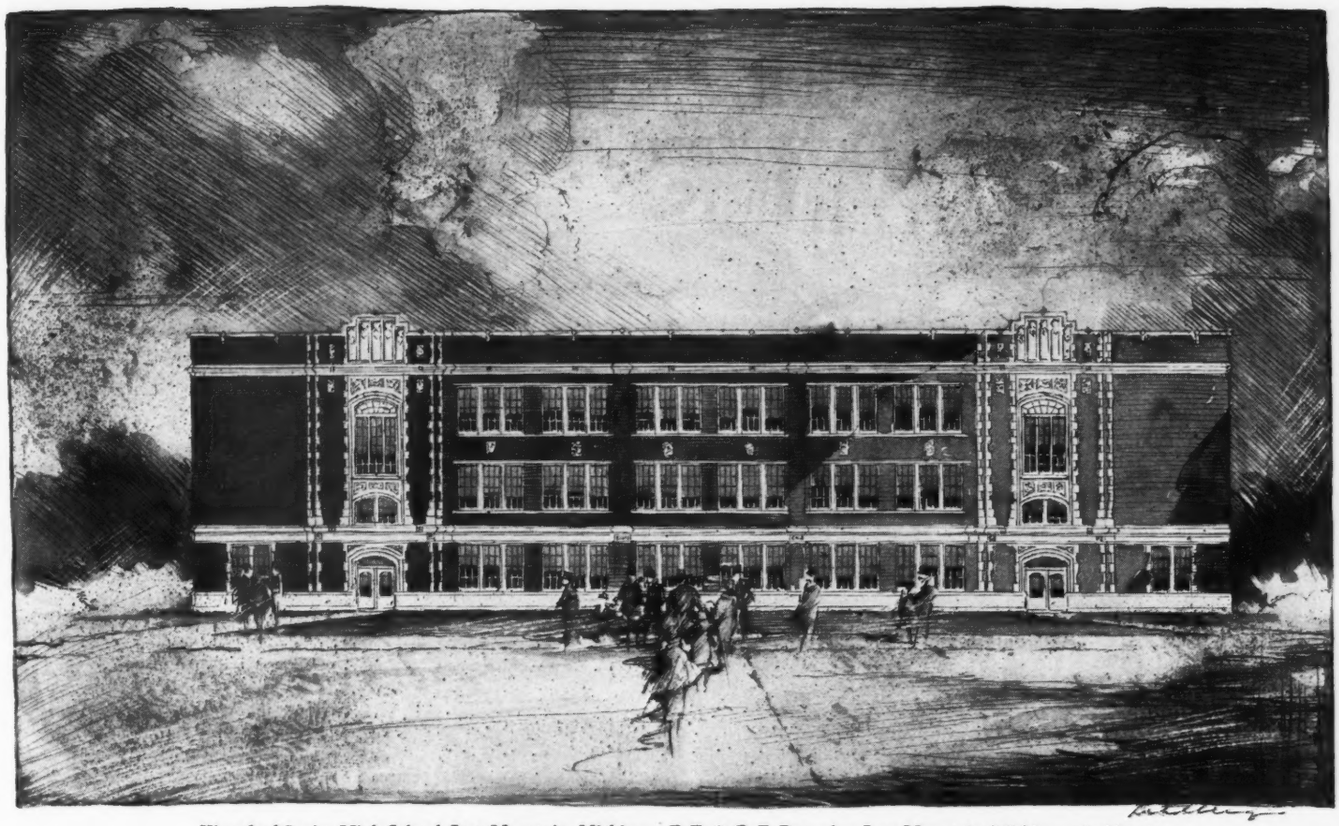

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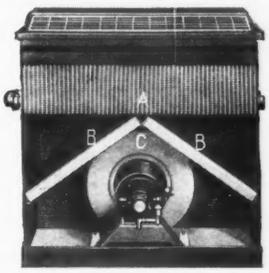
Building Life *and* Health



Open view of UNIVENT *illustrating*

A—Copper radiator without a single joint, absolutely leak-proof.
B—Air filter easily removable for cleaning.
C—Cone type fan specially insulated for quiet operation.

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(TRADE MARK)

Upon the heating and ventilation engineer, hand in hand with the architect, much in life depends. Through his foresight and ideals of perfection—through his optimism—through his insistence upon the creation of new and more scientific methods—come the vital improvements that build up greater human health and happiness.

It was by the ideals of the engineer and architect that the Univent system of ventilation was inspired. Ventilation that combines sound engineering principles with those of modern hygiene. Ventilation that is as nearly perfect as human skill can make it.

The Univent draws fresh air from outdoors, cleans it, warms it, and distributes it gently yet evenly throughout the room—without draft. If you are interested in the heating and ventilating of schools, office buildings, hotels and similar buildings write for the book, "Univent Ventilation," engineer's edition.

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The Heating and Ventilating Magazine

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How Quiet is a "Noiseless" Oil Burner?

A CORRESPONDENT who has been greatly interested in the campaign of THE HEATING AND VENTILATING MAGAZINE against "loose sales talk", noting the advertised claims of several manufacturers that their (several) burners are "noiseless", writes as follows:

"Silence means only one thing, namely, the absence of audible sound vibrations. If you are going to allow manufacturers to use the word 'silent' for burners giving off what to some people would be considered a disagreeable sound, what word or words can the manufacturers use who make burners that cannot be heard when they are in operation?

"When I was a boy at school, our teacher, who was having considerable trouble with the general behavior of the scholars, decided to give two prizes;

1. For the best behavior during a period of two months.
2. For the most improved behavior in any one month.

"My brother, who was somewhat of a philosopher, figured out that, of the two prizes, the second could be rather easily won without great inconvenience to him, provided he could make a bad enough record the first month. He won the prize quite easily, but it would be impossible to describe his conduct during any month as even good."

It is possible that the manufacturers of "quiet" burners may be able to contribute some ideas on this subject, even in self-defence.

YEARLY SUBSCRIPTION $2.00 — **SINGLE COPIES, 30 CENTS**

Published monthly at 1123 Broadway, New York, by the Heating and Ventilating Magazine Co.

Entered as second-class matter, April 18, 1925, at the Post-Office at New York, N. Y., under the Act of March 3, 1879.

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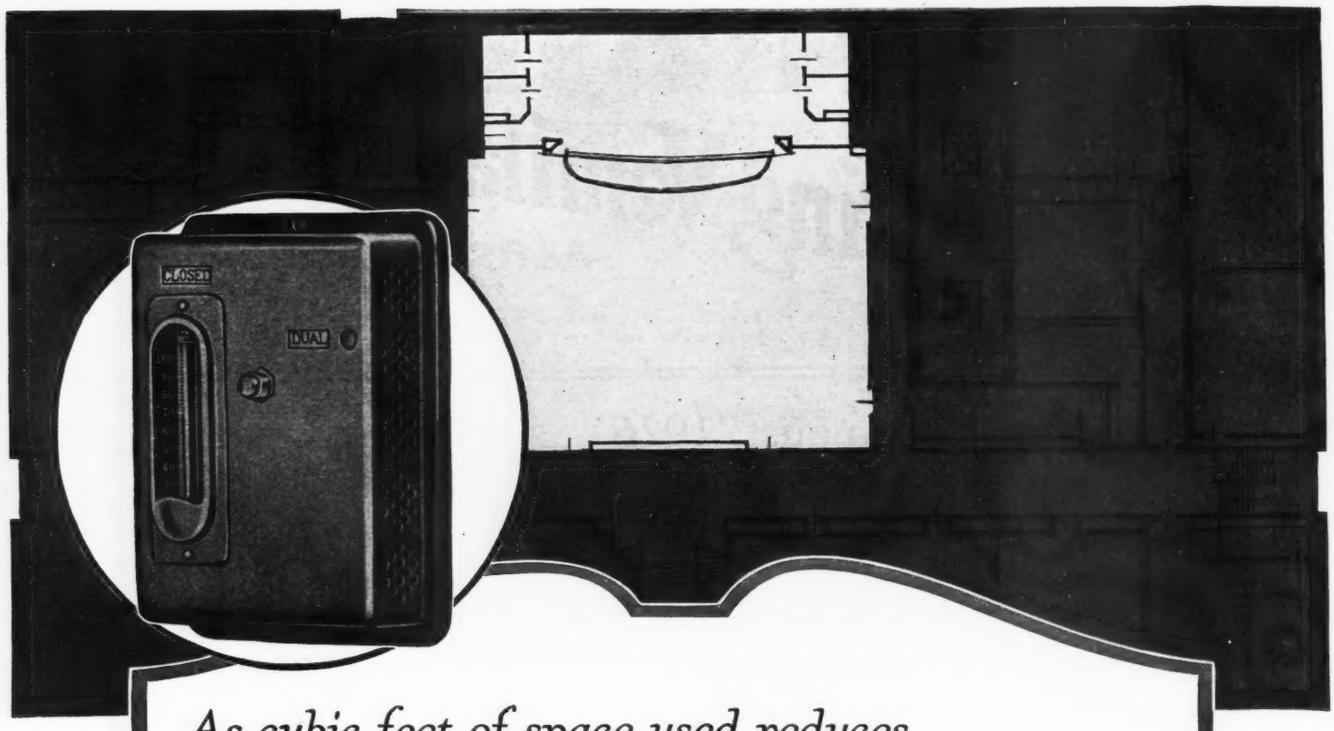

As cubic feet of space used reduces,
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Sacred Heart School - - - - - - St. Paul, Minn.
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